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JANUARY 21, 1943
VOL. 151, NO. 3

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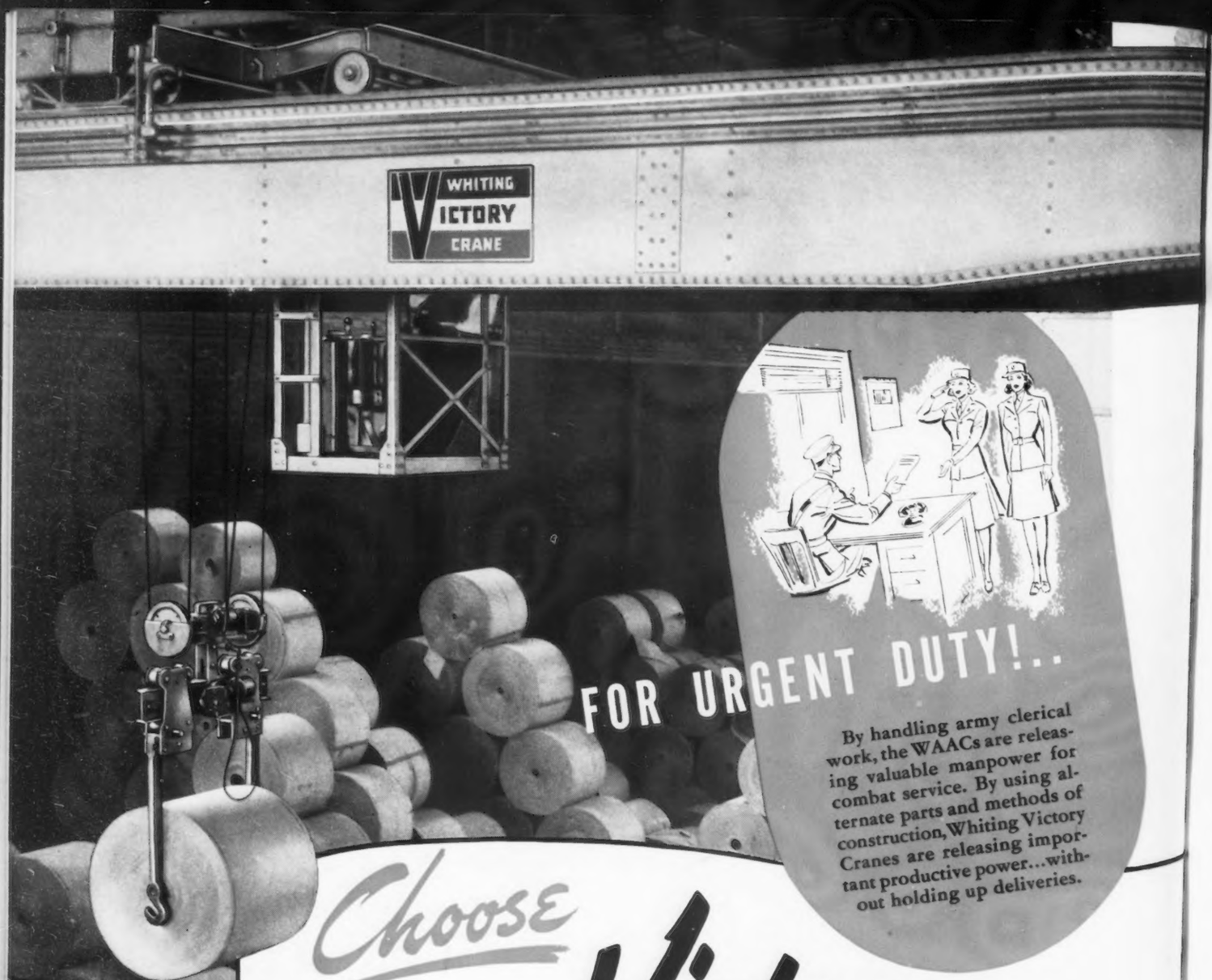

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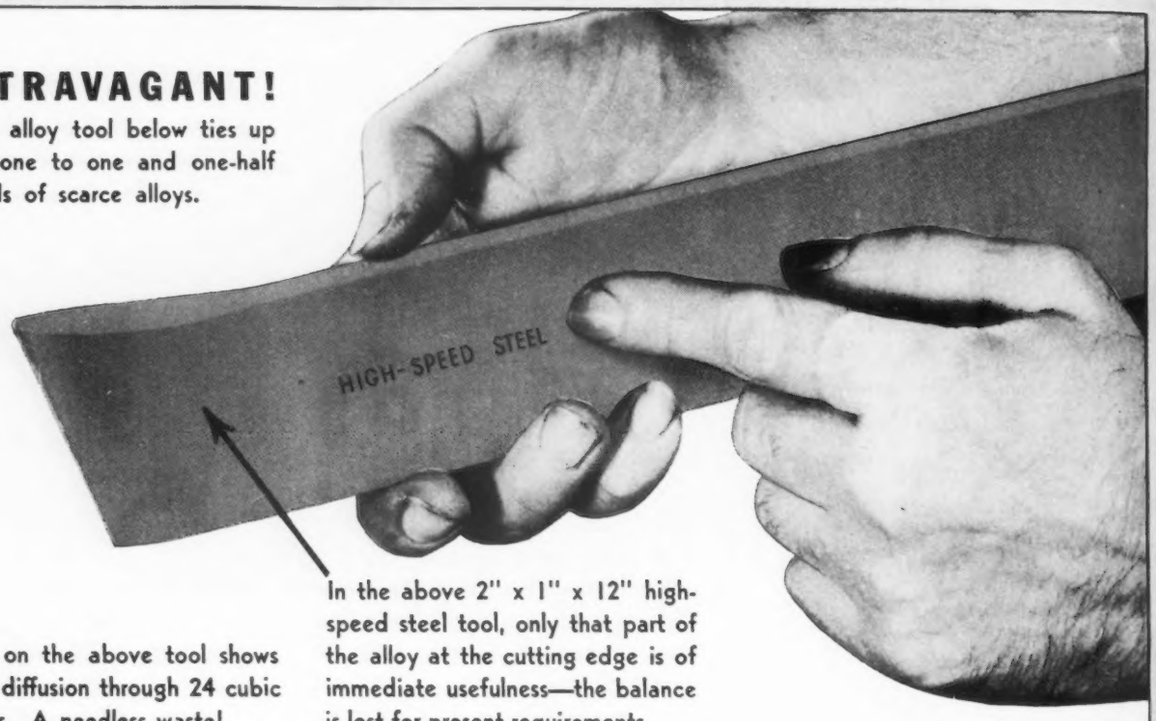
FIRTHITE POINTS THE WAY TO SAVE ALLOYS

EXTRAVAGANT!

Solid, alloy tool below ties up from one to one and one-half pounds of scarce alloys.



PINK on the above tool shows alloy diffusion through 24 cubic inches. A needless waste!

In the above 2" x 1" x 12" high-speed steel tool, only that part of the alloy at the cutting edge is of immediate usefulness—the balance is lost for present requirements.

ECONOMICAL!

Firthite-tipped tool below contains only **grams**—not pounds —of scarce and essential alloys.

RED on the above tool shows alloy concentration, 3/16 of 1 cubic inch, placed effectively at the cutting edge!

This Firthite sintered-carbide tip, brazed to plain carbon-steel shank, measures only 3/8" x 1/2" x 1"—will remove metal faster than high-speed steel, give better finish and more accurate work.

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THE IRON AGE

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ESTABLISHED 1855

Putting the Ratio in Rations

CONFRONTED with a critical shortage of manpower, the men of industry and government have introduced broad, sweeping changes in employment and training policies. Presidential decree 8802 set up as the policy for the United States at war the hiring of Negroes. The War Man Power Commission prophesies that by the end of 1943 six million women will be employed in war industries.

While every effort is being made to increase the number of war workers, the nation's production effort may in a few months be slowly sapped of its vitality. The quart of milk a day promised to every member of the genus homo when victory is ours is not sufficient stimulus for our labor force to break production records. Tantalizing visions do not supply driving energy.

To stay alive the average adult requires 2400 calories a day. But a steel worker, for example, must have 300 extra calories an hour for each hour that he works. Assuming he works an eight-hour day, he must consume a total of 4800 calories daily if he is expected to work every working day. Light work requires 75 calories an hour above the base of 2400 for each hour worked and moderate work 150.

The problem of nutrition is not as simple as just calorie intake. Not only energy must be supplied to the living organism, but building materials as well. Just as an open hearth could produce no steel if only coke were supplied, so the human body cannot sustain itself without the proper proportions of iron, calcium, proteins, carbohydrates, fats and vitamins.

The problem of achieving higher and higher production rates is so vital that we cannot afford to overlook even one facet of its complexity. The human factor is always with us. It is foolish to assume that controlled materials and manpower regulations alone can solve production problems. A whispered rumor that faulty materials are being supplied the armed forces is enough to start a Congressional investigation. But should management sit quietly by while their workers become less and less efficient because no recognition had been made of the greater food requirements of laborers as compared with sedentary workers!

England has met and solved this problem by differential rationing. There, shop canteens and cafeterias serving persons doing heavy work are allotted in some cases as much as 50 per cent more food per person under the point rationing system.

The OPA is loath to start such realistic rationing for fear of political and economic repercussions. Admittedly this is no simple problem, but winning a war cannot be reduced to simple formulas. Ignoring a problem does not solve it. The food rationing division has said that at present vitamin content is satisfactory but what may develop in the way of shortages causes them some concern. Without doubt the OPA is sincere in its attitude, but rationing should be used as a shortage preventive, not as a crutch after the damage is done. And as for preferential rationing, if this practice is followed, and it is, for the men in the armed forces, it can certainly be applied for the men doing the next most strenuous work, the work of producing for war.

J. H. VanDeventer

CONSERVE STEEL
For Our Fighting Forces

Foresighted management now is doing everything possible to conserve the steel already in service, making it last so that all new steel can go into America's war effort.

Preventing corrosive destruction is one effective way to conserve steel and help fight the war on the home front. The initial step is to critically examine all buildings and equipment—bridges, columns, trusses, floors, stairs, roofing, siding, ventilators, ducts, piping, tanks, fences, cranes, machinery, etc.—everything made of steel that is subject to corrosion from dampness, the weather or process fumes.

Paint manufacturers can offer good advice on effective methods of cleaning, and on primer and finish coats that will protect and conserve steel in and about your plant. A program to preserve steel has a valuable secondary advantage, too. Many shades of paint reflect light, and better lighting cuts spoilage, speeds production and reduces the hazards of accidents to America's war workers.

A conservation program more than pays for itself in lower maintenance and replacement costs, but more important now, every pound of steel that is saved is a boost to the war effort.

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Steel Carburization and Decarburization

—A Theoretical Analysis

By JAMES K. STANLEY

Westinghouse Electric & Mfg. Co., East Pittsburgh

. . . To the industrial heat treater, an understanding of the physical chemical principles such as gas equilibria and the diffusion of carbon underlying commercial carburization, as well as the nemesis decarburization, should be of immense practical value. In this, the first of a three-part article, the author discusses types of carburizers and the carbon monoxide-iron system from the standpoint of simplified thermodynamics.

WHILE the literature on carburizing and decarburizing from the metallurgist's viewpoint is voluminous, little basic chemistry and physics have been applied to the processes to make their treatment rational and systematic. A great deal of empiricism still surrounds the practice of commercial carburizing—case hardening—as well as recarburization—formation of soft spots and soft skins.

The physical chemistry of carburization and decarburization can be considered as comprising two parts. The thermodynamics of the gas-metal reactions involved, and the diffusion or migration of carbon. Another factor, the reaction at the gas-metal interface, might be added but since the importance of this has not been demonstrated in these two processes, it will not be considered here. The simplified treatment of thermodynamics involves the study of the gas-metal reactions as governed by the variables, temperature, pressure and concentration. The discussion of kinetics deals with the formation of the case, i.e. the rate of diffusion of carbon into the metal; and in decarburization, it deals with the rate of formation of the decarburized layer, or the migration of the carbon from the metal.

Carburizing, as related to the process of case-hardening, is carried out commercially by three methods: (1) Solid or pack carburizing; (2) gas carburizing, and (3) liquid or fused salt carburizing.

Pack and gas carburizing may be classed together, for it has been shown that solid carburizers function only when there is a gas phase to do the carburizing. In liquid carburizers, the carburization is also thought to be accomplished by carbon monoxide except that the reaction occurs in a liquid, rather than a gaseous phase.

SOLID CARBURIZERS: McQuaid[1] discusses the action of solid carburizers which is probably as follows: At elevated temperatures, oxygen of the limited air supply reacts with charcoal to form CO_2 and CO. The CO_2 then further reacts with the charcoal to produce CO according to the equation

$$CO_2 + C \rightleftarrows 2\,CO \qquad (1)$$

The decomposition of the CO, occurring on the surface of the steel, does the carburizing:

$$Fe + 2\,CO \rightleftarrows C_{(in\ Fe)} + CO_2 \qquad (2)$$

It is argued often, particularly in the older literature[2], that carburization proceeds by the solid phase, i.e. the charcoal reacts in the solid state with the iron. Giolitti[3], however, states that intimate contact of carbon with steel even under pressure results only in very slight carburization, and Jominy[4] finds no carburization by soot even at 2300 deg. F. (1260 deg. C).

The behavior of charcoals toward iron is not simple, but the answer may be explained partly by the adsorptive powers of charcoal (since charcoal with no adsorptive power has little value as a carburizing compound) and the ash content of charcoal (soft wood charcoal can be made as effective as hardwood charcoal by carbonate additions)*.

**Rodman discussing McQuaid's paper*[1].

Energizers are almost always used for improving the carburizing quality of the solid carburizer. These substances are the barium, calcium and sodium oxides and car-

bonates, and their role appears to be that of catalysts rather than reactants.

GAS CARBURIZING[6]: Almost all natural gases are good carburizers. Natural gas is approximately 90 per cent methane[6], and as such is very easy to handle.

In city gas (coal gas), the methane ranges from 25 to 35 per cent, and the carbon monoxide about 10 per cent[7, 8]. City gas, with its relatively high carbon dioxide, water and hydrogen content, has low carburizing power; these constituents must be removed or their concentrations reduced. In some cases the city gas is enriched by passing the gas through liquid hydrocarbons such as turpentine, dipentine, aniline, gasoline or benzine; sometimes such gases as butane and propane are bled into the system, and in still other instances the gas is passed through hot carbonaceous material.

Other carburizing atmospheres have been prepared and have been used successfully. Atmospheres have been prepared by volatilization of such substances as turpentine, gasoline, aniline and benzine. However, the gases are conspicuous soot-formers because of the amount of carbon per unit volume of such vapor, and provision is made usually for control of soot. Desirable mixtures have been made by bubbling hydrogen or nitrogen through the various liquids at a certain temperature so that their vapor pressure is increased or decreased. Butane has been diluted with dissociated ammonia and good results have been obtained. Rich gases such as those mentioned can be mixed with air and used for carburization.

Partially or completely burned heating gas is another source of carburizing gas. Depending on the combustion ratio of gas and air, the products of combustion will be a mixture of water, carbon dioxide, carbon monoxide and hydrogen. If moisture and carbon dioxide are removed or controlled, a carburizing gas results. Flue gas has been successfully mixed with natural gas and used as a carburizing agent. Flue gas often has been passed over heated charcoal and the resulting gas has excellent carburizing quality.

LIQUID CARBURIZERS: Liquid carburization is quite different from pack or gas carburization. In this case the carburization is carried out in a fused salt bath of sodium cyanide with various additions. The transfer of the carburizing material is through the liquid and not the gas phase.

The principle of liquid carburizers is that the breakdown of sodium or potassium cyanide on oxidation produces carbon monoxide which goes into solution, the form in which it is available for carburization. Further, the decomposition of the cyanide also introduces nitrogen.

Since the solid solubility of carbon in austenite is so large and occurs at more favorable temperatures for diffusion, most commercial carburization is conducted in the austenite range, i.e., above the A_3 line. It should be mentioned that carburization and decarburization are possible in both the alpha and gamma states of iron.

TABLE II

Equilibrium Constant of Equation

$$2\,CO + Fe \rightleftarrows C_{(in\ Fe)} + CO_2$$

Temperature		$\log_{10} K$		
°F.	°C.	Best*	Exp.	K from Equation
1380	750	−1.99	−2.02	10.2×10^{-3}
1470	800	−2.33	−2.38	4.7×10^{-3}
1560	850	−2.59	−2.55	2.6×10^{-3}
1650	900	−2.86	−2.82	1.4×10^{-3}
1740	950	−3.06	−3.02	$.88 \times 10^{-3}$
1830	1000	−3.25	−3.27	$.56 \times 10^{-3}$
1920	1050	−3.44	−3.62	$.36 \times 10^{-3}$
2010	1100	−3.64	−3.66	$.23 \times 10^{-3}$

*—Calculated from equation

$$\log_{10} K = -8.43 + 6562\left(\frac{1}{T}\right);\ T = °K$$

It should be recognized that the solid solubility of carbon in the iron cannot be exceeded at any particular temperature. It is not possible to keep adding carbon to the iron in excess of solubility limits. As a matter of fact, this method can be used to determine limits of solubility and is certainly more reliable than microscopic examination, as concentrations can be more easily determined, and in less time.

Some investigators[3, 9, 10, 11] have insisted that formation of Fe_3C is due to temperature fluctuation. This assumption has been proved erroneous. If the austenite is saturated at one temperature and is cooled, Fe_3C separates; if the same austenite is heated to the same temperature, the precipitated Fe_3C is redissolved.

Atomic vs. Molecular Solution

The nature of the solid solution of carbon in gamma iron has often been the subject of considerable dispute. The argument has been whether or not the carbon is dispersed molecularly as Fe_3C, or atomically as carbon.

The atomic theory offers little encouragement for the supposition that solid solutions are molecular. volume considerations bear out the contentions that carbon exists atomically.[12]

Molecular solid solutions have been proposed often, but there is no evidence for such solutions. Arguments based on anomalies in physical properties[13] are open to considerable question; density measurements[14] have been deceptive; no evidence of molecular aggregation has been found in solid solution Al-$MgZn_2$[15]; suggestions of molecular solid solutions as in liquids have been made for certain systems without results[16]; complex intermetallic phases, such as Fe_4W_2C, appear to dissociate into atoms in the iron base alloy.[17]

The state of aggregation in solution is best determined by the kinetic behavior of the components of the system. For instance, if it could be shown that two solutes in a quasibinary system (that is, Al-$MgZn_2$, Cu-Ni_2Si, etc.) with considerable variation in their rates of diffusion do diffuse in molecular ratios, then some basis for the molecular solid solution might exist. Freche[18] found that in the quasibinary system, Al-Mg_2Si, that Mg_2Si tended to diffuse in molecular proportions when the alloy core contained magnesium

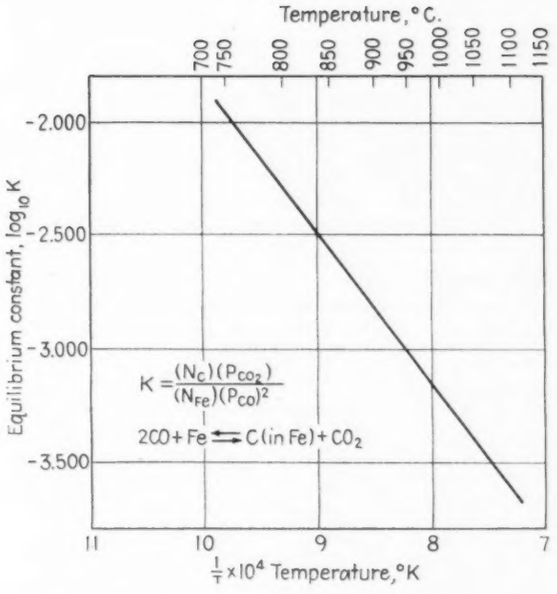

FIG. 1—The carbon monoxide-iron reversible reaction in carburization and decarburization can be expressed by the equation $2\,CO + Fe \rightleftarrows C_{in\ Fe} + CO_2$. The equilibrium constant of this equation is $K = \frac{(N_C)\,(P_{CO_2})}{(N_{Fe})\,(P_{CO})^2}$ where N_C and N_{Fe} are the mol fractions of C and Fe, and $(P_{CO})^2$ and (P_{CO_2}) are the partial pressures of the gases in equilibrium with the iron. The data of equilibrium constants of the CO-Fe reaction given in Table I are plotted above, the straight line representing the equation $\log_{10} K = -8.43 + 6582\,(\frac{1}{T})$ where T = deg. K.

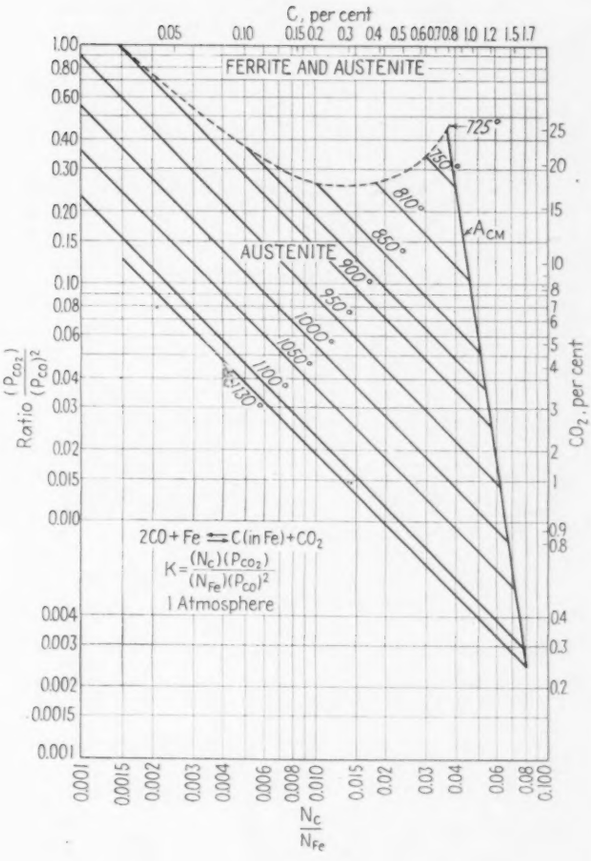

FIG. 2—The ratios $\frac{CO_2}{(CO)^2}$ vs. $\frac{N_C}{N_{Fe}}$ plotted on ordinary graph paper take the form of rectangular hyperbolas. A more practical way to picture these relationships is to plot them on log-log scales where the resulting curve is a straight line. Since it is difficult to interpret equilibrium for these ratios by observation, the percentages of C and CO_2 are plotted as the top abscissa and the right ordinate, respectively. The left ordinate is the ratio $\frac{CO_2}{(CO)^2}$, while the bottom abscissa is the ratio $\frac{N_C}{N_{Fe}}$.

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and silicon in this ratio, but the rates of diffusion of Mg and Si were quite similar. On the other hand, Mehl and Rhines[19] found no definite evidence for molecular diffusion in the quasibinary system, Cu-Ni_2Si.

The main justification for the atomic solid solution, say of carbon in iron, is that it complies with modern concepts of the nature of solid solution, i.e., that solute atoms of carbon are statistically distributed in the interstitial spaces of the solvent iron.

Equilibrium Reactions

In considering equilibrium between the gas and solid phases, it is assumed that time has no effect on the reaction; thermodynamics is concerned only with reversible equilibria and not with kinetics. The thermodynamics discussion, further, will disregard the reactions at the gas-metal interface and the diffusion process. For the sake of simplicity, however, it will be assumed that equilibrium between the gases and the metal is set up instantaneously, such as might result in carburization of an infinitely thin sheet or foil.

In any chemical reaction where one molecule of A reacts with two molecules of B to form one molecule of C and one of D as in the equation

$$A + 2\,B \rightleftarrows C + D \qquad (3)$$

then, by the law of mass action

$$K = \frac{(C)\,(D)}{(A)\,(B)^2} \qquad (4)$$

where K has a definite numerical value for any given temperature, and the quantities (A), (B), (C), and (D), represent the activities (effective concentrations) of the four substances.*

**For a discussion of the law of equilibrium from the viewpoint of the law of mass action and activities, see any text on physical chemistry.*

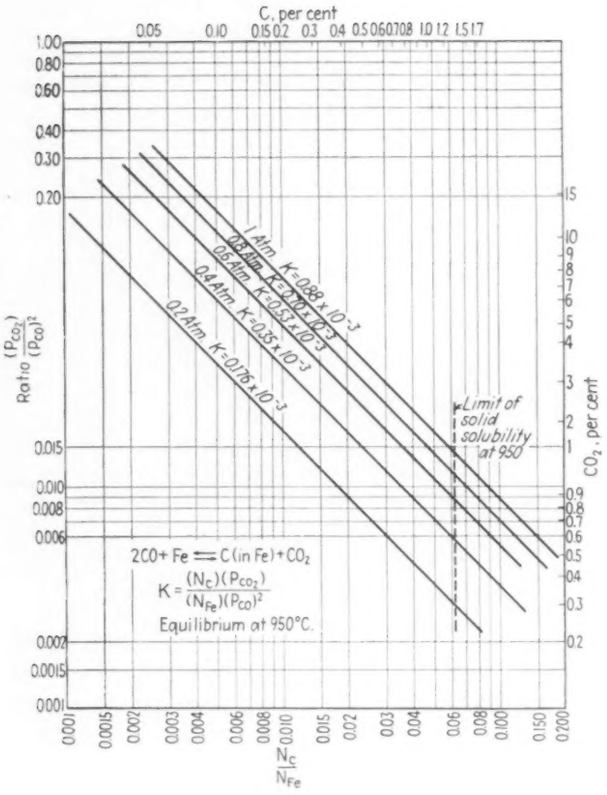

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FIG. 4—Significance of variations in equilibrium constant on carburization.

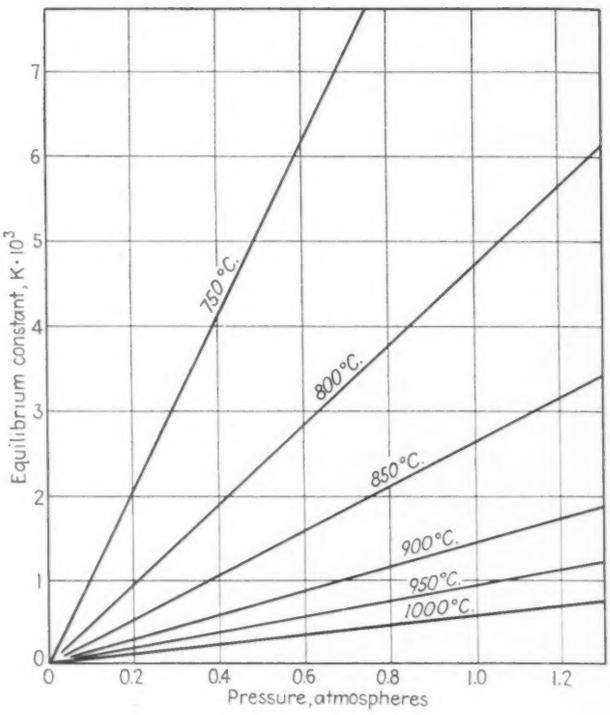

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FIG. 3 — Variation of the equilibrium constant at various pressures.

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It is assumed here that the activities of the solids are proportional to the mol fraction. Mol fraction, N, in a binary solid solution, is defined as

$$N_1 = \frac{n_1}{n_1 + n_2}$$

where n is the number of mols of each component. It also follows that

$$N_1 + N_2 = 1$$

For gases it is assumed that the activities are proportional to the partial pressures.

$$P_1 = N_1 P$$

where N_1 is mol fracion of the gas and P the total pressure. See Dunwald and Wagner[31].

The concentrations of the gaseous and solid phases in carburizing reactions can be written as follows: The empirical equation is

$$Fe\ (s) + 2\ CO\ (g) \rightleftarrows C_{(in\ iron)}\ (s) + CO_2\ (g), \qquad (2)$$

but the thermodynamic one, in terms of activities, is

$$A_{(Fe)} + A_{(CO)^2} \rightleftarrows A_{(C)} + A_{(CO_2)}. \qquad (5)$$

Or, writing activities** as mol fractions for the solids and partial pressures for the gases, the equation becomes:

$$N_{Fe} + (P_{CO})^2 \rightleftarrows N_C + (P_{CO_2}) \qquad (6)$$

Fundamentally, there are two reversible reactions for carburization-decarburization. Equation (2) is the first one and the methane reaction is the second:

$$CH_4\ (g) + Fe\ (s) \rightleftarrows C_{(in\ iron)}\ (s) + 2\ H_2\ (g) \qquad (7)$$

Another theoretical possibility is the simultaneous carburizing and nitriding with the cyanogen compounds.

$$2\ HCN\ (g) + Fe\ (s) \rightleftarrows 2\ C_{(in\ iron)}\ (s) + 2\ N_{(in\ iron)} + H_2\ (g) \qquad (8)$$

Carbon Monoxide-Iron System

The equilibrium constant of Equation (2) becomes:

$$K = \frac{(N_C)}{(N_{Fe})} \frac{(P_{CO_2})}{(P_{CO})^2}$$

where N_C and N_{Fe} are the mol fractions of carbon and iron, and $(P_{CO})^2$ and (P_{CO_2}) are the partial pressures of the gases in equilibrium with the iron.

The data of numerous investigators[20, 27] have been recalculated so that the above equilibrium could be ascertained. These are given in Table I and plotted in Fig. 1. The equation of the line is

$$\log_{10} K = -8.43 + 6582 \left(\frac{1}{T}\right)$$

and the best values calculated from the above equation and the experimental values are given in Table II. These best values are the ones which were used to calculate data for subsequent curves for the monoxide reaction. The plotting ratios of $(CO_2)/(CO)^2$ vs. $(N_C)/(N_{Fe})$ as rectangular hyperbolas on ordinary graph paper is difficult, for the curves are hard to draw and the interpolation can be very inaccurate. A more practical way is to plot the ratios $(CO_2)/(CO)^2$ vs. $(N_C)/(N_{Fe})$ on log-log scales where the resulting curve is a straight line. This is shown in Fig. 2. Obviously such curves are easy to draw and interpolation is simplified. The ordinate at the left is the ratio of $(CO_2)/(CO)^2$, while the abscissa at the bottom is the ratio of $(N_C)/(N_{Fe})$. It is difficult to interpret equilibri-

um for a plot of $(CO_2)/(CO)^2$ vs. $(N_C)/(N_{Fe})$ by observation, so that the percentages of carbon and carbon dioxide are plotted as the top abscissa and right ordinate, respectively.

From Fig. 2, the equilibrium between steel and the gas phase can be found. For instance, to prevent decarburization of 1 per cent C tool steel at 1740 deg. F. (950 deg. C.) an atmosphere of about 98.3 per cent CO and 1.7 CO_2 must be maintained. As another example, the effect of temperature on the equilibrium between a 1 per cent carbon steel and the atmosphere, can be demonstrated from the figure which shows that more carbon monoxide is necessary for the equilibrium with the increasing temperature.

So far the discussion of carburizing has been restricted to gases at a total pressure of one atmosphere. That is to say that

$$P_{CO} + P_{CO_2} = P_{(1\ atmosphere)} \qquad (11)$$

In commercial practice, the carburizing gases are actually at a lower pressure—the sum of the partial pressures is less than atmospheric—being diluted with N_2.

$$P_{CO} + P_{CO_2} + P_{N_2} = P_{(1\ atmosphere)} \qquad (12)$$

This type of carburizing atmosphere is produced when natural gas is burned in air.

If the equilibrium constant is known for one atmosphere, the amount of carbon in equilibrium with the gas at any pressure can be calculated.

It is known from equation (9) that

$$\frac{(N_C)}{(N_{Fe})} = K\frac{(P_{CO})^2}{(P_{CO_2})} \qquad (9)$$

By algebraic processes it can be established that

$$\frac{(N_C)}{(N_{Fe})} = \frac{KP}{\dfrac{(P_{CO_2})}{(P_{CO})}\left(1 + \dfrac{P_{CO_2}}{P_{CO}}\right)}$$

TABLE I

Equilibrium Constant of Equation

$$2\,CO + Fe \rightleftarrows C_{(in\ Fe)} + CO_2$$

$$\text{where } K = \left(\frac{N_C}{N_{Fe}}\right)\left(\frac{P_{CO_2}}{P_{CO}^2}\right)$$

Temperature		1-T (abs.)	Equilibrium Constant K · 10^3					
°F.	°C.		(I)	(II)	(III)	(IV)	(V)	$\log_{10} K^*$
1380	750	9.8×10^{-4}	11.9	10.7	6.25	.....	9.6	−2.018
1470	800	9.3	5.9	3.9	2.78	.....	4.2	−2.377
1560	850	8.9	3.4	1.9	.....	3.1	2.8	−2.553
1650	900	8.5	2.6	1.02	.93	1.5	1.5	−2.824
1740	950	8.2	1.35	.60	.....	.94	.96	−3.018
1830	1000	7.8	.85	.36	.36	.58	.54	−3.268
1920	1050	7.6	.....	.24	.....	.....	.24	−3.620
2012	1100	7.3	.....	.16	.28	.....	.22	−3.658

(I) Takahashi
(II) Bramley and Lord
(III) Johansson and von Seth
(IV) Becker
(V) Average

*—$\log_{10}K$ can be expressed by the straight line relation

$$\log_{10}K = -8.43 + 6560\left(\frac{1}{T}\right) \text{ where } T = °K$$

It is known, however, that

$$\text{Per cent C} \sim \frac{N_C}{N_{Fe}}$$

so that the carbon content can be found.

Pressure Effect on C Equilibrium

From the above equation it can be seen that

$$K = \frac{\dfrac{(N_C)}{(N_{Fe})}\ \dfrac{(P_{CO_2})}{(P_{CO})}\left(1 + \dfrac{P_{CO_2}}{P_{CO}}\right)}{P} \qquad (18)$$

The variation of the equilibrium constant at various pressures is given in Fig. 3. The effect of this variation in the equilibrium constant and its significance in carburization is seen in Fig. 4.

Numerous observations are possible from the log-log plot of Fig. 4. For instance, with a constant ratio of $(CO_2)/(CO)^2$ (constant CO_2 content) the carbon in equilibrium with the steel increases with increasing pressure. Also at lower pressures of carburizing gas, the higher must be the CO content to preserve the original carbon content of the steel.

Ed. Note.—Next week, the author continues with a discussion of the methane-hydrogen mixture and its effect on carburization of steel. The thermodynamics of decarburization will also be explained.

Hardness of Tin-Base Alloys

THE effect on hardness, produced by quenching from the highest practicable temperature followed by prolonged tempering at 212 deg. and 284 deg. F. has been examined by the Tin Research Institute, London, for 80 tin-base alloys containing 4 to 14 per cent antimony and 0 to 10 per cent cadmium. This research is part of a program conducted by the institute to determine methods of obtaining new and stronger tin-base alloys suitable for use as bearing metals.

The results of the hardness tests are recorded in a paper by W. T. Pell-Walpole, B.Sc., Ph.D., in the *Journal of the Institute of Metals*, Vol. 68, October, 1942.

It is shown that these alloys can be hardened by heat treatment and maintain a useful degree of improvement for at least 1000 hr. at 212 to 284 deg. F. The best alloys in this respect are those in the range: Antimony 9 to 10 per cent; cadmium 1 to 1½ per cent, balance tin. The degree of improvement is indicated by Vickers diamond pyramid hardness tests. Values of 33 to 34 are obtained, compared with values of 26 to 30 in the normal non-heat-treated condition.

Silica and Semi-Silica

ALTHOUGH silica, even when chemically pure, melts at a temperature little above that employed to make good steel, its other properties, in particular its ability to carry a load to within a few degrees of its melting point and its tolerance for comparatively high concentrations of iron oxide and lime, have enabled it to maintain its position as the No. 1 steel-works refractory. Thus in a recent study of costs in one steel plant, it was found that even if all the casting pit refractories and the dolomite used for fettling were included, the cost of silica brick represented over one third of the total expenditure on refractories. Since silica brick is cheap compared with basic brick, or with the special shapes used in the casting pit, it will be seen that as a weight percentage the proportion of silica used is about one half of the total, even if no account is taken of the sand used for molding and for fettling open hearth furnaces.

The numerous modifications of silica have long been the subject of lectures and articles. So involved have some of these discussions become that the mere mention of cristobalite and tridymite is enough to arouse annoyance and confusion in many steel plant operators. Nothing can be done to reduce the number of modifications, though the silica brick manufacturer can, by controlled firing, insure that the steel plant man is relieved at least of worries due to free quartz. In actual fact, the relations between those silica modifications which affect the steel plant are not particularly complicated, as it is hoped the following description will demonstrate.

Quartz, being one of the most common minerals in the earth's crust, is known to everyone, if only as sand or sandstone. The quartz crystals in the rocks from which silica brick are made are similar to rock crystal but are much smaller and are cemented together, usually by finely divided silica, to form aggregates known as quartzites. The relation between the positions of the silicon atoms in the silicon-oxygen lattice in quartz is shown in Fig. 1. The oxygen atoms, which are considerably larger than the silicon atoms, are not shown, but are located on the linkages between the silicon atoms.

If a quartz crystal is heated up and X-ray photographs are taken at intervals it can be shown that at about 1065 deg. F. the structure undergoes a small change, which according to Gibbs is due to an alteration in the lattice to a type like that shown in Fig. 1a. It will be seen that there has not been any disruption of the lattice, but merely a straightening out of the linkages to give a truly hexagonal structure. Thermal expansion curves made on any material high in quartz show a rapid increase in rate at this same temperature, while cooling curves show this change or "inversion" to be reversible.

Jay has shown by calculation from Debye-Scherrer X-ray photographs (Fig. 2) that the expansion of the lattice is not the same in each direction, as it is say with magnesia. This offers an explanation of why the inversion should occur since it is clear that relative displacement of the atoms might lead to a state in which the forces acting on these atoms would no longer maintain equilibrium. Fig. 2 also shows the rapidity of the 1065 deg. change and the slight contraction which occurs with quartz (though not with fired silica brick) above this temperature.

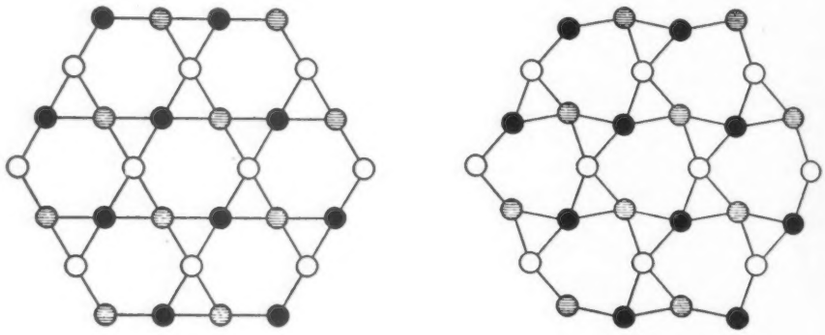


FIG. 1—Arrangement of silicon atoms in (a) beta, or high temperature quartz and (b) alpha, or low temperature quartz.

Working Face Structure

If the heating is continued above 2000 deg. F. it is found that the quartz pattern begins to disappear giving place to the pattern of another form of silica, known as cristobalite, which can be shown by pycnometer determinations to have a lower specific gravity. X-ray examination shows that in this modification the silicon and oxygen atoms are distributed in the manner illustrated in Fig. 34. This solution of the structure of so-called

Previous articles by J. H. Chesters, on steel plant refractories, that have appeared in THE IRON AGE *are:*

"All-Basic Open Hearth Furnaces," Aug. 15 and 22, 1940.

"Steel Plant Refractories," Feb. 6 and 13, 1941.

"Basic Open Hearth Above Sill Plate Level," May 22 and 29, 1941.

"Electric Steel Plant Refractories," March 5 and 12, 1942.

"Acid Open-Hearth Refractories," May 28 and June 4, 1942.

"Soaking Pit and Reheating Furnace Refractories," July 16 and 23, 1942.

"Acid and Basic Bessemer Refractories," Nov. 5 and 12, 1942.

Refractories

By J. H. CHESTERS
Central Research Department, United Steel Companies, Ltd., Stocksbridge, England

. . . This is the first of two articles continuing the author's series on steel plant refractories. Here he describes the behavior of silica brick under varying temperatures and its reactions with oxides, and compares customarily used raw materials.

beta cristobalite was worked out by Wyckoff from a photograph taken at 555 deg. F. It may differ slightly from the absolute configuration but at least serves to show in a rather striking manner the reshuffle which has occurred in the lattice. It should be emphasized that there has been no loss of either silicon or oxygen in this process, but merely a re-orientation of the atoms to give a cubic structure. It is this mineral which constitutes the working face of an open hearth furnace roof, as already discussed in a previous section on the basic open hearth (THE IRON AGE, May 22 and 29, 1941). Like quartz, it undergoes an inversion on cooling from the beta to the alpha form. This latter is different from the high temperature variety; being tetragonal though with an axial ratio only slightly greater than one. The temperature at which the inversion takes place varies over a considerable range according to the calcination temperature and the quartzite from which the cristobalite was formed. With unused silica brick the range can conveniently be limited by the temperature interval 390 to 570 deg. F. but with used bricks from open hearth furnace roofs, the inversion temperature is much more closely defined.

One further complication remains: Beta cristobalite, if held for an appreciable time between 1600 and 2680 deg. F., tends to form tridymite, the mineral with the arrow head twin crystals, illustrated in the section on testing (THE IRON AGE, Feb. 6 and 13, 1941). The formation of this mineral is greatly accelerated by the presence of certain mineralizers, notably alkalies and iron oxide. On cooling, tridymite also undergoes inversions to low temperature stable forms. For those who prefer to have their information in the form of phase diagrams, Fig. 3 may be of interest. The temperatures given in this diagram are based on the early work of C. N. Fenner. The precise temperatures and the nomenclature used in describing the different modifications vary considerably throughout the literature, but the data given in Fig. 4 are all that the steel plant man requires.

The interest of this rather complex problem to the steel maker lies in the fact that the expansion characteristics of a silica brick are a function of the nature and amount of the silica modifications which it contains. Furthermore, if appreciable amounts of raw quartz are still present when the brick is put into service, a considerable growth may be expected as soon as the brick approaches a temperature above that at which it was fired. Since the expansion which occurs when cristobalite passes through its inversion at 390 to 570 deg. F. is about 0.5 per cent, it is essential that furnaces built of silica brick should be heated slowly through this range, if shattering of the brickwork due to differential thermal expansion of the hot and cold face is not to occur.

Two other properties of pure silica that may affect its durability in use are its volatility and its tendency to form silicon monoxide (SiO) in a reducing atmosphere. It is unlikely that its volatility is

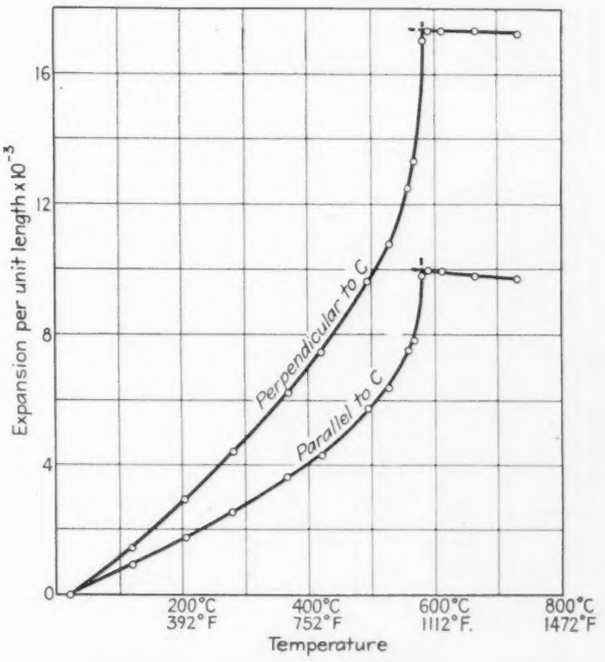


FIG. 2 — Chart showing thermal expansion of quartz parallel and perpendicular to the axis. Note the effect of the alpha-beta transition at 1065 deg. F.

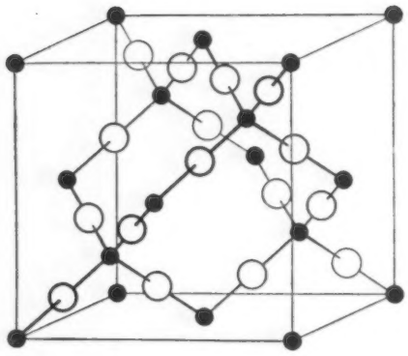


FIG. 3—Arrangement of silicon and oxygen atoms of beta (high temperature) cristobalite. It is this mineral which constitutes the working face of an open hearth furnace roof.

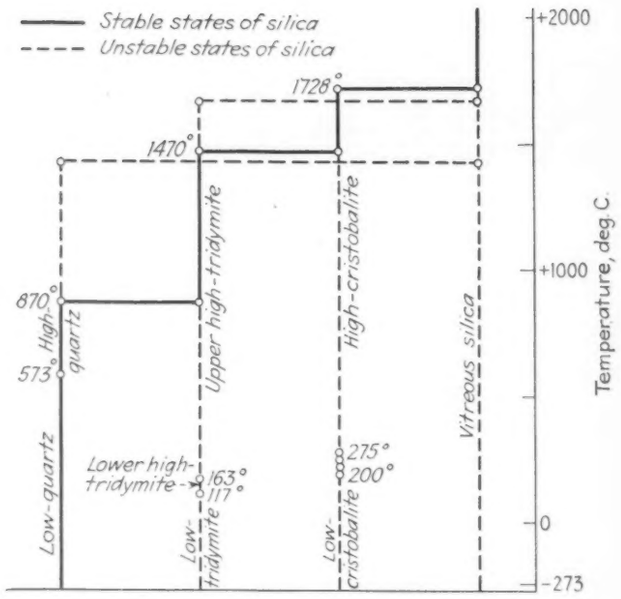


FIG. 4—Phase relationships of the varieties of silica.

sufficient at steelmaking temperatures to result in much loss of brickwork, but the formation of SiO may well be a factor in arc furnace roof life. A description of this little known and most unstable material has recently been given in THE IRON AGE (Jan. 22, 1942), by Zappfe and Sims.

The summary given above is much compressed and those who wish to study the subject in more detail and to gain a knowledge of the historical aspects of the work are referred to Sosman's classical work, *The Properties of Silica*.

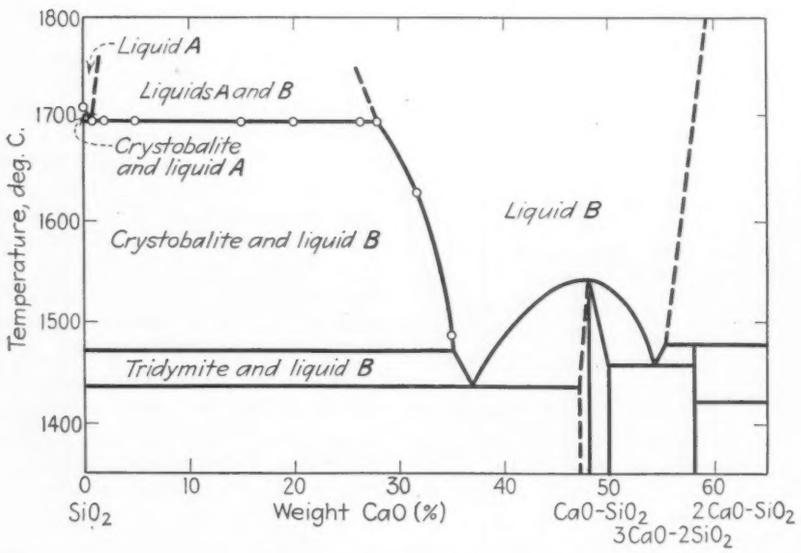
Reactions with Oxides

The raw material for silica brick manufacture is usually 96 to 98 per cent silica. Lime is normally added as a bond, the amount varying between 1 and 2.5 per cent. The effect of lime on the melting point of silica, which is illustrated in Fig. 5, is therefore a matter of considerable importance. It will be seen from this diagram that the effect of lime (and incidentally of one or two other oxides) is peculiar in that a replacement of almost 30 per cent of the silica results in only a small drop in melting point. This unusual phenomenon is attributed to the fact that lime and silica do not react on heating to form a single liquid, but form two liquids that are immiscible in much the same way as water and kerosene. The addition of even small quantities of certain other oxides, such as alumina, destroy this immiscibility and lead to a steady drop in refractoriness. Hence it is most important that if lime be used as a bond, the quartzite should not be high in alumina or alkalies.

The reactions between silica and iron oxide are set out in the phase diagram given in Fig. 6. Here again there is immiscibility and only a small drop in melting point even with a 40 per cent substitution by FeO. This is of vital importance to the steelmaker since otherwise silica refractories would be rapidly slagged away by the iron oxide in the furnace atmosphere. In actual practice, the iron in contact with the silica is by no means all in the ferrous state but the same tendencies are present even in the ternary system SiO_2-FeO-Fe_2O_3. Sosman suggests that the iron oxide pick-up and its effect on the melting point of a roof limits the safe operating temperature to 3000 deg. F. Since pure iron melts at about 2795 deg. F. it will be seen that the furnace must be kept within quite small temperature limits if good steel is to be made without excessive damage to the silica refractories. In many works, a deadline of 3000 deg. is considered rather low, an operating temperature of 3055 deg. being considered quite reasonable. Much higher temperatures (well over 3090 deg.) are periodically recorded by roof pyrometers but these are usually associated with dripping of the roof and a consequent drop in roof life.

The reactions of silica with alumina are also of great importance

FIG. 5—Equilibrium diagram for the system SiO_2-CaO, illustrating the effect of lime on the melting point of silica.



since alumina occurs in the natural rock, while clay is sometimes used as a bond for silica bricks and always as a bond for the so-called "ganister," used for patching launders, and acid furnace tapholes. Most silica cements used for setting silica bricks contain a clay addition and here it is most essential that the amount present should not be sufficient to result in the joints running out at top temperature or in serious attack of the cement on the adjacent bricks. The equilibrium diagram SiO_2-Al_2O_3 will be discussed in more detail in the section dealing with fireclay. For the present it suffices to state that the lowest melting points occur with an alumina content of only about 5 per cent.

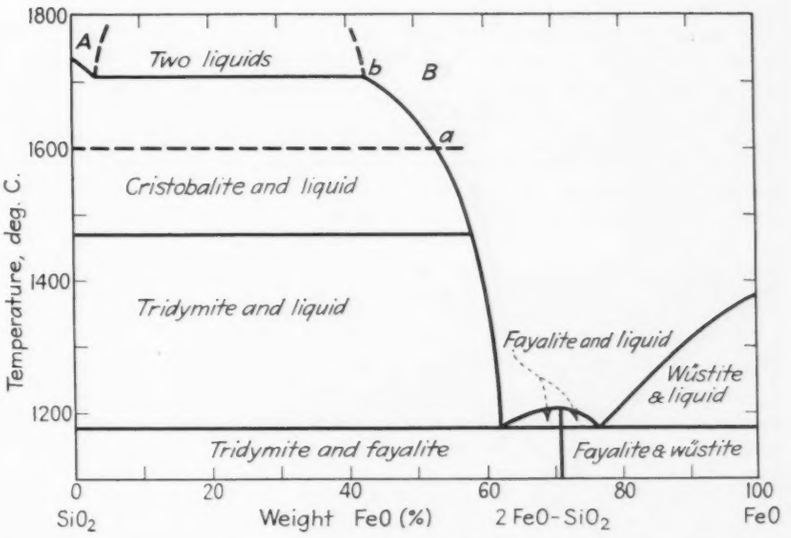
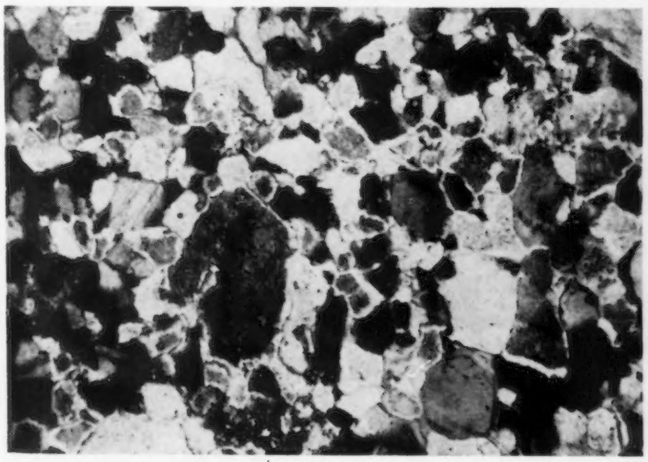


FIG. 6—Equilibrium diagram for the system SiO_2-FeO, illustrating the reactions between silica and iron oxide.

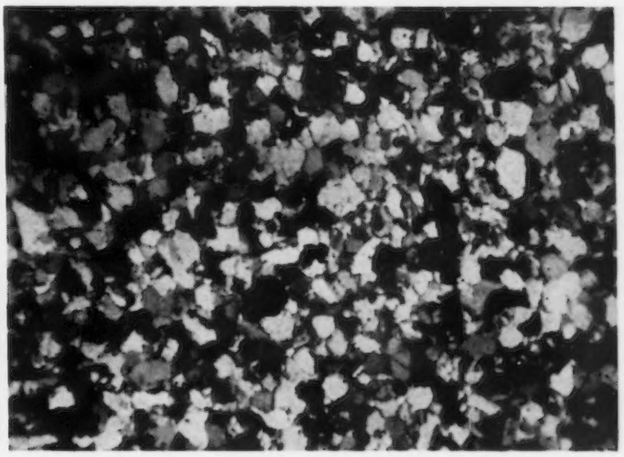
Raw Materials

It has been suggested by Sosman that silica suitable for brick making could probably be found in any county in the United States, even though the cost of mining and the quality of the product make silica brick manufacture uneconomic except in certain regions. The main American deposits now in use are the Tuscarora formation of Pennsylvania, the Baraboo formation of the Devil's Lake region in Wisconsin, and the Weisner formation of Alabama. The first two of these are usually described by the terms eastern and western quartzite, while the operation of the Alabama deposits is doubtless dependent on sale to the local steel industry. Austin, Pierce and Lundberg have discussed the effect of varying raw material on the properties of bricks made from these different deposits and find a higher thermal conductivity for the western brick which they attribute to its lower porosity.

This difference in porosity raises an interesting point which is clearly brought out by the raw materials employed in Germany. Until re-



7A

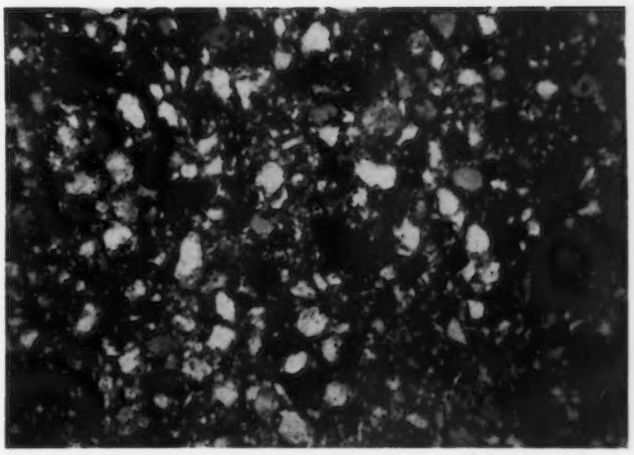


7B

o o o

FIGS. 7a, 7b and 7c — Note the large and irregular crystal size of the Welsh quartzite (a), the small and uniform grain size of the Sheffield ganister (b), and the small but varying grain size of the German Findlings quartize (c).

o o o

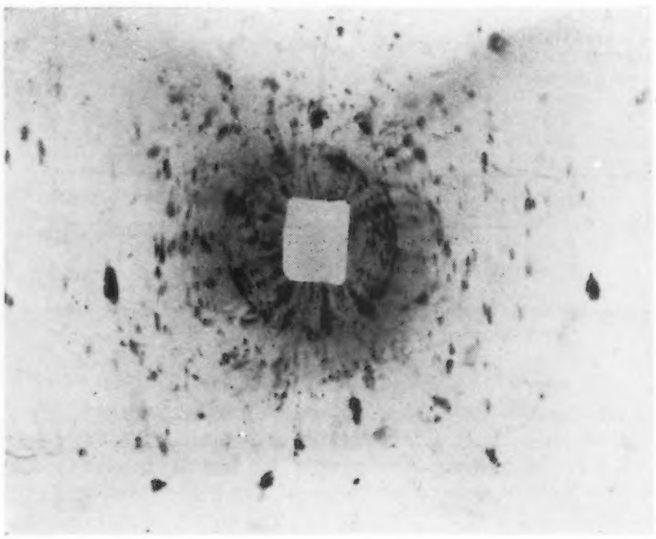


7C

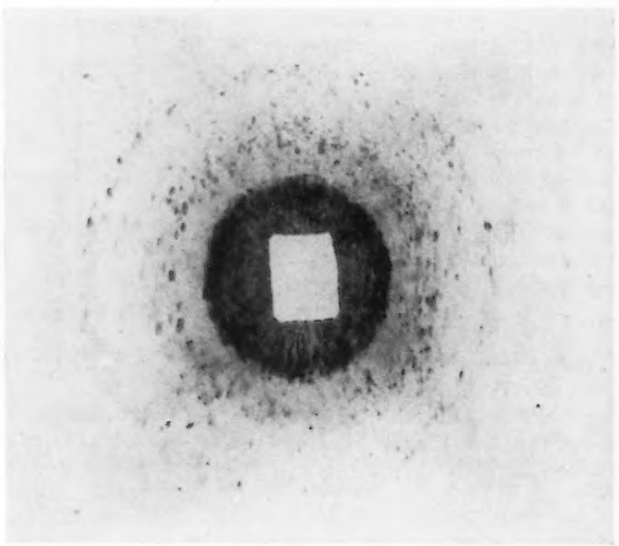
cently most of the German brick were made from the so-called Findlings quartzites which have a unique structure and are eminently suitable for the manufacture of silica brick. Whereas the American and British quartzites are of medi-

made up of a large number of submicroscopic crystals arranged at very slight inclinations to one another. It is well known that quartz converts more rapidly on heating if the crystal size is small, and that conversion can therefore be speed-

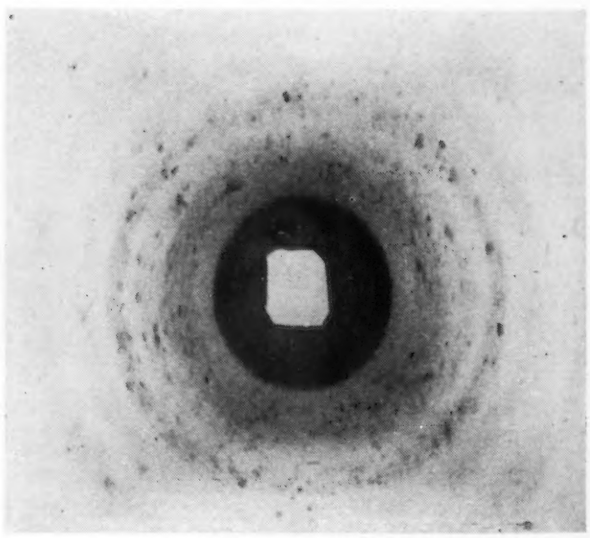
a higher thermal shock resistance, has led to a world wide search for similar material. So far, however, no commercial Findlings type material appears to be used, other than in Germany, with the exception of comparatively recent em-



8A



8B



8C

FIGS. 8a, 8b and 8c—X-rays of the three quartzes which were shown in thin section in Fig. 7. The Welsh quartize is shown in (a), the Sheffield ganister in (b) and the German Findlings quartzite in (c).

um or coarse crystal size, the Findlings shows a wide range, including some very fine material. This is illustrated by Figs. 7a to 7c, which show photo-micrographs of a Welsh quartzite, a Sheffield ganister and a Findlings quartzite. One result of this difference in crystal size is that the Findlings quartzite shows a much more rapid rate of conversion to cristobalite and tridymite.

X-ray photographs taken of similar samples, those shown in Figs. 8a to 8c, revealed even more interesting contrasts. It will be seen that the pattern given by Sheffield ganister consists of rings of fairly uniform dots, while with the Findlings quartzite the pattern consists of smooth rings, due to reflections from extremely fine crystals with occasional larger dots superimposed. With the Welsh quartzite the spots are larger and more irregular. Back reflection photographs published in a recent Iron and Steel Institute paper on a "Co-operative Investigation of the Factors Influencing the Durability of the Roofs of Basic Open Hearth Furnaces" show that this quartzite is in a strained condition and that, although from a microscopic point of view the rock is coarsely crystalline, it can also be considered as

ed up by fine grinding. With this Welsh material it is the sub-microscopic crystals which determine the rate of conversion and hence it is found that on firing, the conversion is far more rapid than would have been expected from the chemical analysis and the petrological examination. The ease with which silica brick may be made from Findlings quartzite and the resultant quality of the brick which tend to have not only a low porosity but

ployment of the South African crypto-crystalline quartzite as described by Bosazza.

Quite as important as the crystal size of the quartzite is its porosity before and after firing. The results obtained on a number of rocks are set out in Table I and may be considered typical of the problem as a whole. It will be seen that the Findlings material had a porosity of only 0.3 per cent before firing, as compared with 1.0 per cent for

Welsh quartzite, 4.6 per cent for Sheffield ganister and 13.9 per cent for a bastard ganister (used for launder material but not considered suitable for silica brick manufacture). On firing, the advantage of the Findlings material becomes still more obvious. Its porosity has risen to only 3 per cent, compared with 12.2 per cent for the Welsh quartzite, and 11.6 per cent for the Sheffield ganister. It is obvious that if the individual grains of which a brick is made are themselves highly porous after firing, then the problem of making a low porosity silica brick from this material is greatly increased. Furthermore, the fired brick like the calcined rock is likely to be weak.

The difference in conversion rate as judged from the drop in specific gravity is not so striking, though here again the Findlings material is the best, showing a drop to 2.41 after 1 hr. at 2640 deg. F. compared with 2.46 for the Welsh quartzite and the Sheffield ganister. The extent of the conversion can be judged from the fact that cristobalite has a specific gravity of 2.32 and tridymite of 2.26 as compared with 2.65 for raw quartz. Another characteristic of the Findlings quartzite is its high titania content which is usually about 1 per cent, as compared with about 0.2 per cent for most quartzites. Such experiments as have been made suggest that this titania, which is evenly distributed throughout the quartzite, may well be a factor in producing a brick that has a high thermal shock resistance and which matures readily in use. Other materials used in silica brick making are high grade silica sand and prefired brick. The former is added unground in small amount or as ball milled fines. The latter provides a use for shapes cracked in the kiln and is a considerable help in making large blocks since it reduces the firing expansion.

TABLE I

Properties of Quartzites Before and After Firing For 1 Hr. at 2640 Deg. F.

	Sheffield Ganister	Bastard Ganister	Welsh Quartzite	Findlings Quartzite
Chemical Analysis	Percent	Percent	Percent	Percent
SiO_2	96.8	94.3	97.8	97.8
Al_2O_3	0.9	3.2	0.6	0.4
Fe_2O_3	0.7	0.5	0.4	0.3
CaO	0.1	0.1	0.1	0.1
Specific Gravity				
Unfired	2.66	2.64	2.66	2.64
Fired	2.46	2.42	2.46	2.41
Apparent Porosity				
Unfired	4.6	13.9	1.0	0.3
Fired	11.6	22.8	12.2	3.0

Editor's Note: Next week the author concludes this study with a discussion of the manufacture and properties of silica brick and brief comments on semi-silica and silicosis.

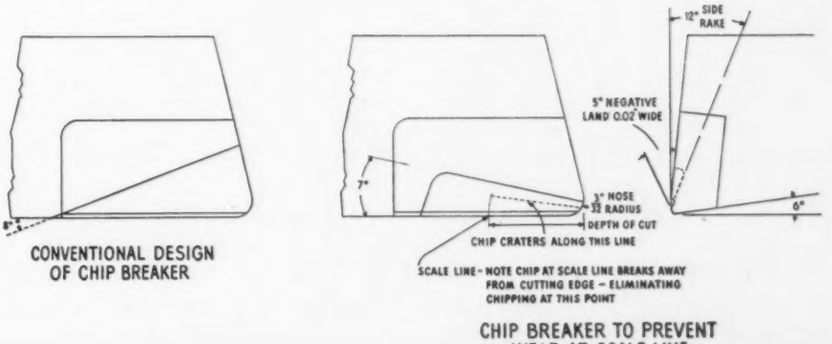
Cutting Stainless with Reverse Angle Chip Breaker

AN unusual solution to the problem of machining stainless steel has been discovered by the Firth-Sterling Steel Co., McKeesport, Pa. Stainless steel is soft but extremely tough and it is necessary to cut through scale in a rough turning operation.

Although many types of carbide tool angles were tried, including negative top and side rakes, positive rakes with negative lands, parallel and angular type chip breakers and dulling the cutting edge at the scale line, the tools invariably chipped at the scale line or were worn away at that point after only about 5 min. run.

The solution was found in reversing the angle of the chip breaker groove. The usual practice in the grinding of carbide tools for cutting of steel is to grind the chip breaker wide at the nose of the tool and to taper the groove off in the direction of the shank. This procedure was reversed. As indicated by the drawing, the chip breaker was ground to an angle of 7 deg., with the narrow end of the groove starting at the nose radius. This was done with the thought that the chip cleavage would occur further ahead of the cutting edge at the scale line than at the nose radius.

This grind of the tool prevented edge failure even at double the feed and speed formerly used. A tool life of 8 hr. was secured cutting dry at a speed of 200 ft. per min. and a feed of 0.012 in. per rev., using grade HA Firthite.



CONVENTIONAL DESIGN OF CHIP BREAKER

CHIP BREAKER TO PREVENT WEAR AT SCALE LINE

Cleaning 20 and 155

WHEN contracts were awarded Willys-Overland Motors, Inc., by the armed services for the manufacture of 20 and 155 mm. shells, considerable experimentation was necessary in their cleaning and conditioning prior to painting, since there were no proved methods available along these lines. The types of cleaners, washing machines, degreasers, etc., were all comparatively new, and there were many problems involving rust contamination of cleaning solutions by iron oxide and scale from heat-treated forgings, contamination of coolants by cleaning compounds, and contamination of coolants by salts from liquid salt baths.

First, it was discovered that the solution in the liquid bath that is used to heat shells for nosing operations had to be changed. Various types of acid cleaners were tried, but, while it was found that the acid cleaners did a very good job of cleaning, they were impractical because of their corrosive effect on the metal in the washing equipment.

Following these trials, various alkali cleaners were experimented with, and it was found that alkali cleaners did only a fair job insofar as metal cleaning was concerned. Partially because of the washing equipment, alkali cleaners left a thin film of alkali on the finished shell, and this prevented perfect adherence of the lacquer to the surface of the shells.

Another cleaner, Solventol, was tried and found successful in all phases of the process. Cleaning properties of the cleaner were excellent, it is rust preventive, and, after cleaning with Solventol, the base for the lacquer coating is good. This cleaner is used directly after the shot blast operation to safeguard the inside surface of the shell against rust. This cleaning operation is performed in a special conveyor type dip tank built by the Solventol Co., Detroit, and the cleaning after shot blasting takes place before the shells are heat treated.

After heat treating 155 mm. shells, it was found that iron oxide scale mixed with the Solventol cleaning material and would not settle to the bottom of the cleaning tank. With this mixture of iron oxide in the solution, it caused oxidation of the surfaces of the shells. For the dip tank operation, consequently, Quasol No. 936 was tried, and it was found that the oxide would settle to the bottom of the tank in this solution and the Quasol prevented rust. Thus, it was found most advantageous to use Solventol for cleaning and Quasol for rust prevention.

Close control over coolants after the salt bath heating operation for nosing the shells was found to overcome most rust problems. By close watching, the coolants-change in all the machine operations, before the separation of the soluble oil and water has started, could be controlled. If separation of soluble oil is permitted, rust will appear very quickly. While at present there is not 100 per cent efficiency so far as rust elimination is concerned, it is felt that the company has made big strides in that direction through experiments as well as aid from the suppliers of salt, cleaning compounds and oil.

Another difficulty that arose was that the rubber gravity conveyor rolls that carried the shell from the final washing operation had a tendency to deteriorate and pick up dust, dirt, greases, oil, etc., and the clean surfaces of the shells were being contaminated again interfering with the painting. By wiping each shell with a cloth saturated with lacquer thinner this difficulty was overcome. This practice is in use at the present time and will likely remain in use.

20 mm. Shell Cleaning

The 20 mm. shell washer is of the spray type with a capacity of 240 gal. Solution level is maintained by a float valve and overflow device. The cleaning solution is heated by two gas-fired heat exchanger tubes, the fuel gas flow being controlled thermostatically. The entire washer is covered by a forced draft hood and the steam and vapors are exhausted through a 10-in. pipe. Running through the washer hood is a roller type conveyor. Spray nozzles are located under the conveyor, along its sides and top. providing spray from four directions on any work in the washer. Cleaning solution is supplied to the spray nozzles by a single stage centrifugal pump at the rate of 150 gal. per min., at a 95 ft. head at 3450 r.p.m. At the operating temperature, 180 deg. F., forceful jets are produced.

Solventol No. 27, a solvent type cleaning material, is used to wash 20 mm. shells. It is used in a 1 to 40 concentration; 1 gal. of Solventol No. 27 to 40 gal. of water. Solventol No. 27 is a liquid concentrate of synthetic-organic solvents which is neutral and partially miscible with water. By partially miscible it is meant that about 60 per cent of the solvent mixes and creates a stable solution with water. The remaining 40 per cent exists as an insoluble which floats on the water-cleaner solution phase as a blanket. This insoluble phase is gradually dissolved into the water phase as washing takes place, thus maintaining and stabilizing the cleaning solution.

Cleaning with Solventol No. 27 is based upon a dispersive effect rather than on any chemical reaction. Its ability to clean by dispersion makes possible the removal of all types of soil, grease, dirt and chips from all types of cavities and grooves in the metal part. Following the cleaning, all that is required is an air blow off, and the shells come out clean, bright and conditioned against rust and cor-

Fifty-seventh in a Series of Articles on the Technical and Economic Aspects of Metal Cleaning and Finishing

mm. Shells

By S. G. HAWLEY
General Superintendent, Willys-Overland Motors, Inc.

. . . A new basic principle in metal cleaning applicable to precision parts is described here as applied to 20 and 155 mm. shell cleaning. Rapid dirt and grease removal, safety on all metals, complete free-rinsing, rust and hand soiling prevention, and one stage operation with an air blow-off are advantages claimed for it.

rosion. In addition to the cleaning effects on the shell itself, the dispersion action tends to keep the washing equipment, sprays and nozzles free from grease and dirt.

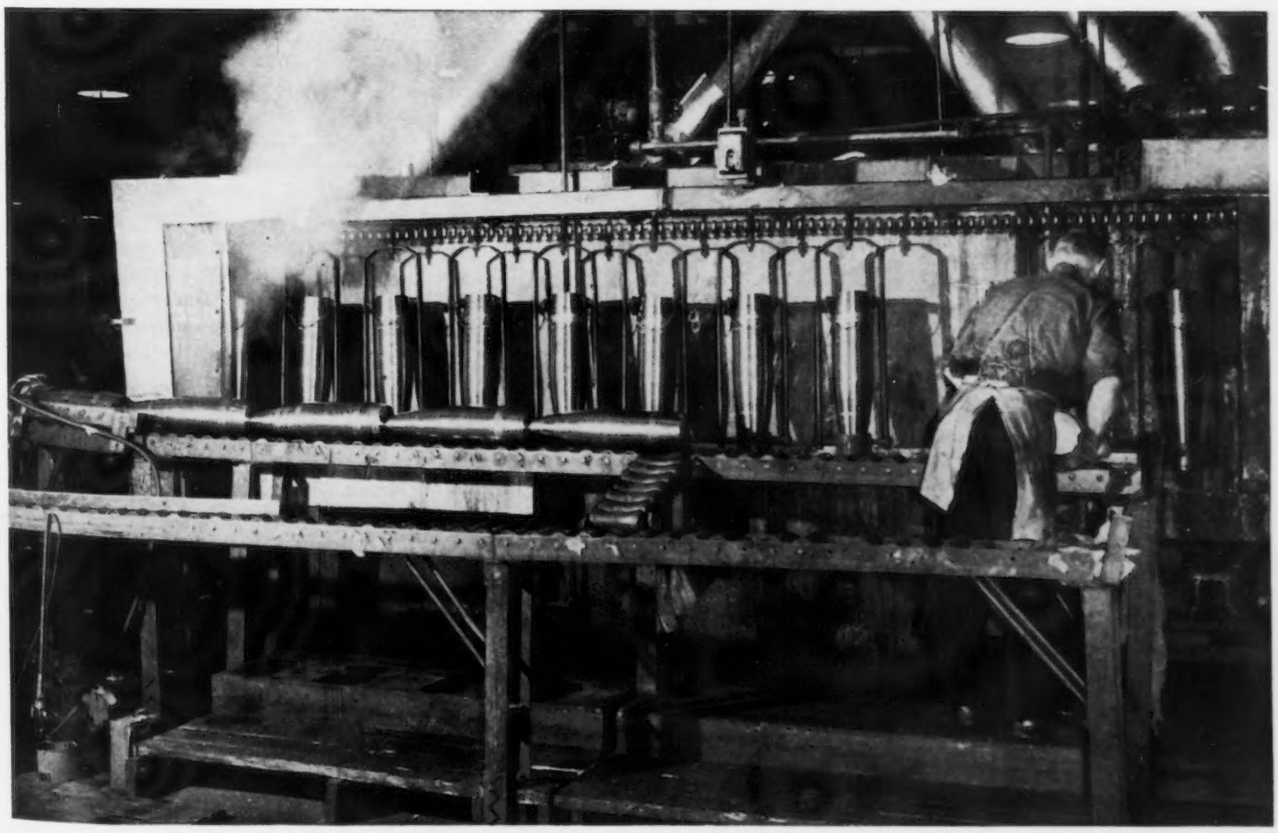
The washing racks for holding the shells are of two types, each holding 132 shells. They are of welded construction and are of either galvanized wire or perforated galvanized sheet, so designed that each shell is separated from other shells in the rack by a partition, thereby exposing its entire surface to the sprays. The cavity of the shell is also subjected to the sprays from the bottom of the tank through openings in the washing rack.

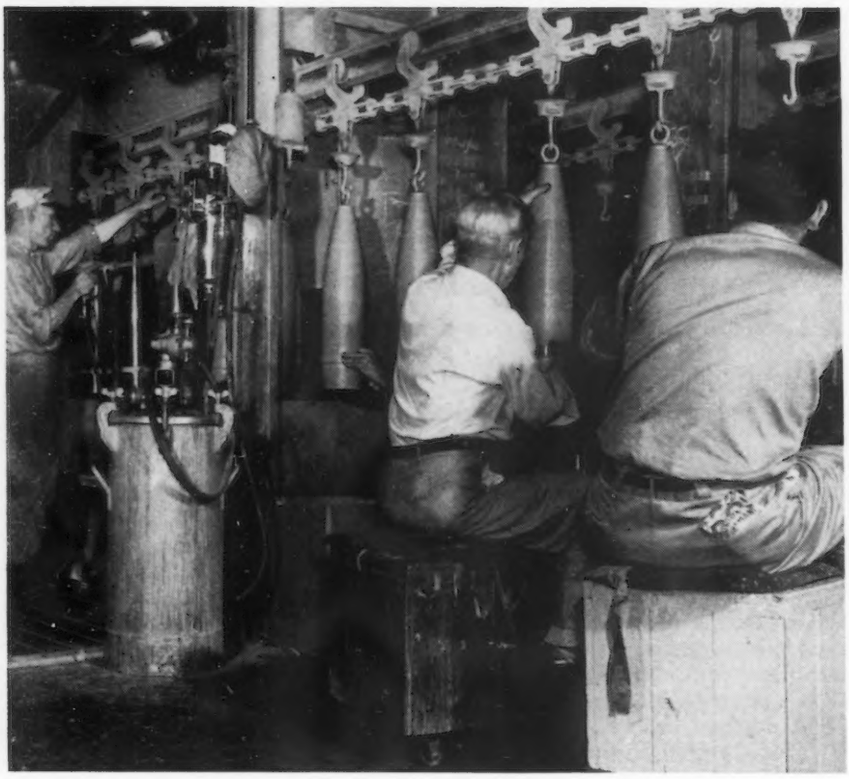
The cleaning cycle consists of four separate steps. On coming from the last machining operation the shells are placed in the washing racks, cavity end down, and covered with a metal cover to prevent them from falling out when the rack is turned over. The racks are then agitated in a kerosene solution containing Solventol No. 27 in a concentration of 9 gal. of kerosene to 1 gal. of the cleaner. The purpose of this dip is to remove excess cutting oil before the shells are placed in the washer.

After the kerosene dip, the cover of the rack is removed and the shells are drained for about 2 min. The rack, with the shells, is then passed into the washing machine where the rack is moved backward and forward on a conveyor for 3 min. It has been found that 3 min. is ample time for cleaning and all chips and oil are removed. No rinse is given the shells.

After 3 min. in the washer the shells are heated sufficiently so that rapid drying occurs with an air blow off. In this operation, each shell cavity is individually given a

FIG. 1—High explosive 155 mm. shells are arranged in washing racks, in an inverted position, held in place by wire loops. This conveyor takes the shells through the washing machine and back to the unloading station. Chemical shells are similarly loaded into these racks but the shell cavity is stoppered.



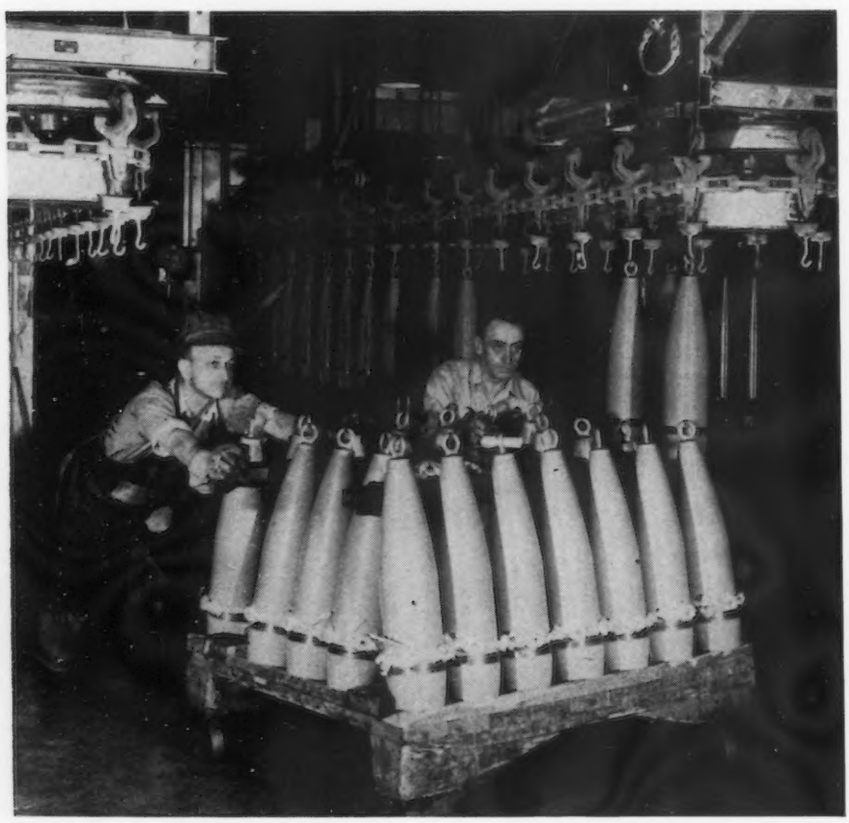


ABOVE

FIG. 2—Following washing and inspection, the shells proceed to these painting booths. For good paint adherence, the shells must be thoroughly clean, and finding a suitable cleaning method was a major problem.

BELOW

FIG. 3—From the painting racks, the shells are transferred to railroad cars for shipping to loading plants. By the cleaning methods described, rejections of shell for rust, soiled surfaces, non-adherence of paint, and other surface defects were reduced almost to a negligible amount.



blast of air to remove cleaning solution droplets. Particular attention is paid to this operation, since once the shell is cold, drying takes place very slowly and dampness will cause rusting in the cavity. Total time for drying one rack of 132 shells is approximately 3 min.

When the shells have been properly washed and dried they are bright and clean. Rust inhibition by the Solventol cleaning compound is good, but of course, the protection is dependent upon the type of exposure to which the shell is subjected. It has been found that under normal factory conditions when ordinary care has been exercised, unpainted shells can be stored for three or four months.

155 mm. Shell Cleaning

The equipment and methods of cleaning 155 mm. high explosive and chemical shells are identical with those used in cleaning 20 mm. shells with two exceptions. Chemical shells are plugged with rubber stoppers before going into the washer, and the chemical shells are painted blue gray while the high explosive shells are painted yellow.

The 155 mm. shell washers are of the two solution, spray type, with built-in air and steam blow-offs. The washer and rinse tanks each have a capacity of 250 gal. Centrifugal pumps supply the spray jets with 75 gal. of solution per min. at a 70 ft. head. Solution level is manually maintained and overflow devices are built into the tanks. Steam coils are used to heat the washer and rinse solutions, and the entire washer is covered by a forced draft hood, exhausting the vapors through a 10-in. pipe.

Running through the washer between the spray nozzles and out and around one side of the tank is a conveyor of the endless link chain variety. Attached to the conveyor chain are 24 washing racks which are so constructed that the shells are cradled in a vertical but slightly inclined position, nose end down. A half loop of wire is hinged at the top of each shell rack and swings down to prevent the shell from falling out of the rack. As the shells are about to exit from the rinse side of the washer they are given a thorough steam and air blow-off, complete drying being obtained by evaporation from the hot shell. Here, again, Solventol No. 27 is the cleaning agent used. Concentration of the 155 mm. shell wash is 1.5 gal. of

cleaner to 250 gal. of water, and the rinse concentration is 0.5 gal. of cleaner to 250 gal. of water.

The cleaning process for these shells is similar to that for the 20 mm. shells. The shells come from the last machining operation ready for the washer with the chemical shells stoppered and the high explosive type shells unstoppered. They are manually lifted from the conveyor and set into the washing racks. This loading is done while the washing racks are moving past the operator, the racks requiring 9 min. to make a complete cycle through the washer.

When the racks are loaded they pass into the washing, rinsing and drying machine. When washing and drying is complete the shells are then lifted manually from the rack to a conveyor where they move by gravity to inspection. At the inspection stand complete examination and weighing is performed and the shell proceeds to subsequent painting operations. This cleaning method, like that used in cleaning 20 mm. shell, provides a bright, clean surface that is highly receptive to paint. Solventol cleaner conditions the surface of the metal, prohibiting for varying lengths of time rusting and atmospheric corrosion.

Wheel Forging Replaced by Brazed Steel Disks

o o o

By C. H. HANNON

Works Laboratory, General Electric Co.

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IMPROVED manufacturing methods and the substitution of less strategic metallurgical materials is the common trend today. Circumstances often arise where changes must be made to expedite delivery of equipment. This applies even in the case of applications involving materials which normally would be considered not on the critical list. An example of one such change was the fabrication of steel transformer truck wheels by the hydrogen furnace, copper brazing process.

Normally, such truck wheels are purchased as steel forgings, but the production capacity of forge shops has been taxed to the point where adequate delivery in some cases could not be obtained. Consideration was given, therefore, to the possibility of cutting disks from scrap steel plate by means of a gas torch and brazing these sections together to form a truck wheel blank, Fig. 1. The overall cost of such a wheel is greater than the forging, but is a small factor when considering the importance of apparatus delivery.

The only precaution required in the fabrication of brazed truck wheels is to be certain that the surfaces of the scrap steel disks are ground smooth enough to make a good contact. It is customary to drill a small hole through the center of the disks to permit stacking on a steel pin so that when the copper which is placed between the steel disks melts, the assembly does not slide out of position. The actual brazing operation is performed in the usual manner by heating the assembly in a controlled atmosphere furnace to a temperature above the melting point of copper at which time the copper will flash throughout the joint between the steel disks.

Actual shear loading tests have been made on wheels fabricated by brazing without failure in the brazed joints at loads far in excess of design loans applicable to the truck wheels in service. Transverse bending tests, Fig. 2, were also made on rectangular sections machined from brazed truck wheels to observe the strength of the brazed joints in bending. These transverse specimens were cut with the axis of the test piece parallel to the axis of the truck wheel. Actual rupture occurred outside the brazed joints.

FIG. 1—Four steel disks cut from scrap plate are hydrogen brazed to form the blank (left) for a transformer truck wheel. At the right is the finished wheel, which was formerly a forging.

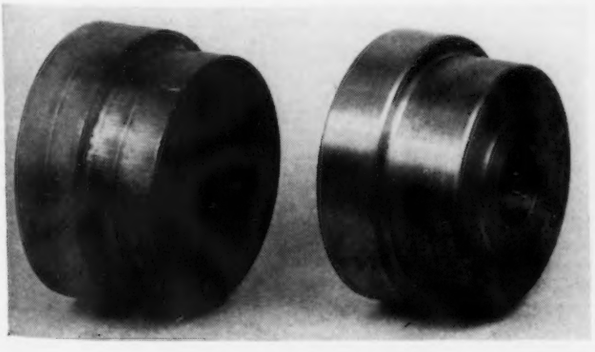
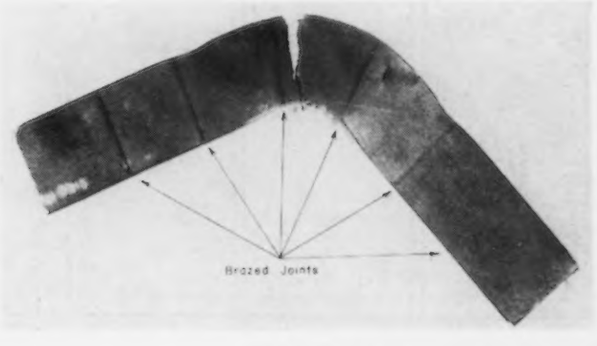


FIG. 2—Cross-sectional transverse bend specimen from brazed transformer truck wheel. Ultimate rupture occurred in the plate material rather than in the brazed joints.



Working Out Techniques for

THE arc welding process has opened an entirely new field of manufacturing, that of welded tanks. The methods that have been developed can be used on every type of welded fabrication, in many cases to a big advantage on present work, and to a tremendous advantage on future fabricating work.

Welded tanks are a necessity for saving human life. The riveted tank previously made would not stand the shell fire or shock, and this reason was enough to bring a new and better method to the front. This country must have thousands not hundreds of tanks. The arc welding process was a logical choice.

Through extensive developments, manufacturers are holding tolerances that have previously been asked only from the machine tool industry and are learning every day that if more effort is put behind welding fabrication, the demand for machine tools is reduced tremendously. Riveting requires many times the amount of machinery. Most important is that through welding we will be able to manufacture tanks in large volumes and not be dependent on so many machine tools nor on inadequate steel foundry capacity.

Welding eliminates hundreds of pounds of butt straps. This means less weight per horse power and increase in performance. Welding process saves a large amount of machine tools due to flame cut edges and absence of drilled holes.

Early Trials

Fisher Tank Division started welding operations with different ferritic welding rods. This ended in complete failure due to the high hardenability of the high alloy armor plate, and because we did not preheat and postheat or anneal. Failure was due to excess cracking at the fusion zone. Under shock firing, such plates fell apart with first shot at about 900 ft. per sec. impact. In these early experiments we did not make detailed studies of warpage or try to hold close limits in manufacturing due to the failure of the welds.

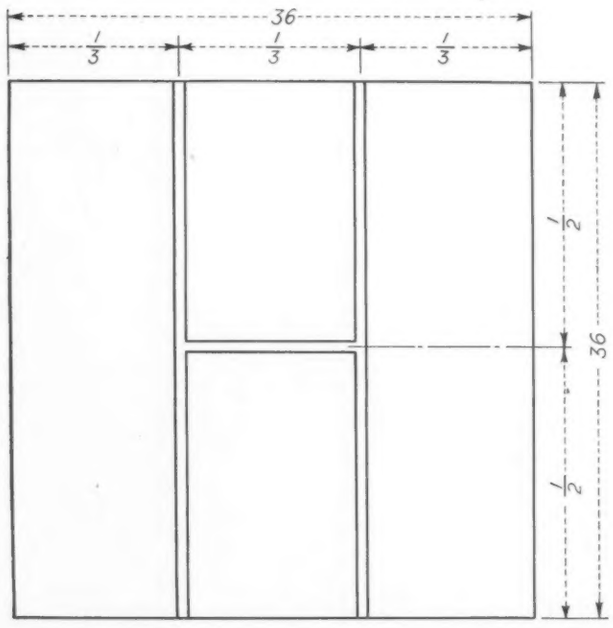
If armor plate specifications are changed to low enough alloys with low hardenability, ferritic rods should do the work, but at this date such steels do not exist for manufacturing purposes that will pass ballistic and shock tests as set up by the U. S. Army Ordnance Department.

Next tests were made with an austenetic electrode commonly known as Stainweld. This rod was more successful and sound welds were made which passed Aberdeen Proving Ground tests. Using the above rods, however, caused a series of troubles such as root bead cracking and excessive grinding and chipping was required.

At this time, too, alloy rods were hard to get and it looked as if Stainweld would not be available for tank manufacture.

Welding electrode manufacturers started to develop a lower alloy rod for welding high alloy armor plate of high hardenability. Better results were obtained from Armorweld. There was less cracking in fusion zone and less cracking in weld metal. The material also had better ballistics for weld deposits.

The deciding test is the shock test developed by Aberdeen Proving Ground. This consists of an H plate weldment 36 x 36 in., Fig. 1, wedged into a standard and fired at by a 75-mm. gun at 100 yards. [For further details of the H plate test see the article on "Welded Armor Plate for Tanks," THE IRON AGE, Jan. 14.] The shell did not penetrate the weldment but was used to give the weld a very severe shock. It was found that plates welded with Stainweld would not stand the same shock Armorweld plates would. The outcome was that besides saving alloys, a better rod



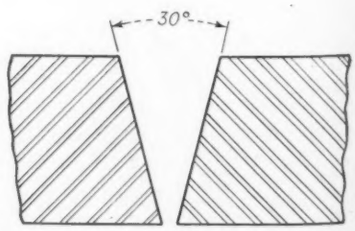
LEFT

FIG. 1 — Standard H plate weldment used at the Aberdeen Proving Ground for subjecting fabricated armor plate to a ballistic shock test.

o o o

RIGHT

FIG. 2—This type of plate preparation has not proved successful for welding armor plate.



Welding Armor Plate

By E. G. BIEDERMAN
Fisher Tank Division, Flint, Mich.

. . . The author describes a number of experiments conducted to determine the most successful methods for welding armor plate for combat tanks and shows which welds stand up best in ballistic impact tests. This paper won one of the awards in the recent $200,000 industrial progress award program conducted by the James F. Lincoln Arc Welding Foundation. Possible annual cost savings of almost $2 billion by arc welding were shown by the many papers submitted.

was found for manufacturing tanks. From here on Armorweld was used exclusively except for tests with Stainweld and an actual saving of approximately 33 per cent was made in the cost of welding electrode and in the use of chrome nickel alloys.

Welding Technique

Present everyday welding procedures were found inadequate in manufacturing tanks. There are very few fabrications in low carbon steel or otherwise that must stand inspection shock test of a 75 mm. shell fired point blank or that must be held to such close tolerances in building. This meant a new development of plate edge preparation to keep warping to a minimum.

All plate edge preparation is done with the flame cutting method. This means flame cutting must be held to much closer tolerances. No edge for welding should be done otherwise because of the savings possible. If edges are machined it means tying up machine tools and labor and takes a lot more plant space. It is almost impossible to estimate this saving in dollars and cents, but it is tremendous. It has now been proved that a flame cut edge can be held within limits for tank building.

The single V of 15, 20, 30, or 40 deg. has been in use as a standard plate edge preparation for normal welding fabrication. This preparation, however, has not been successful for welded tank manufacturing.

A weldment made with a 30-deg. included angle, Fig. 2, was very unsatisfactory. Despite use of extensive fixtures made to hold welded parts, warpage from shrinkage, Fig. 3, could not be controlled. After trying 20, 30 and 45 deg. single Vs, these angles were discontinued except for test purposes.

Tanks must be fabricated by welding and hold tolerances of 1/64 in. at places where parts bolt to the tank such as the front end drive, suspension wheels, idler brackets, turret ring and a lot of other assemblies. Close dimensions like these have never been held before on a fabricated part. They were always welded and then machined. Even if it were possible to machine different areas of the tank, the machines are not available. That is why we must weld and hold tolerances just the same as machine parts. The double V was then adapted, Fig. 4. It takes double the edge preparation that a single V takes, but it was found to be the answer for weld strength and the only possible way to hold tolerances throughout tank manufacturing on a production basis without using machine tools.

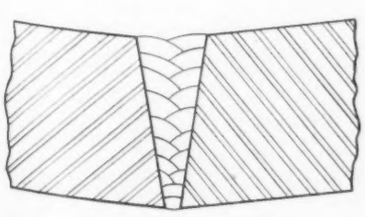
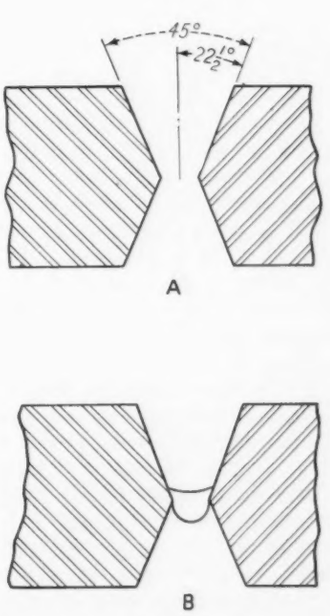


FIG. 3—Exaggerated example of warpage resulting from shrinkage in a single V type weld.



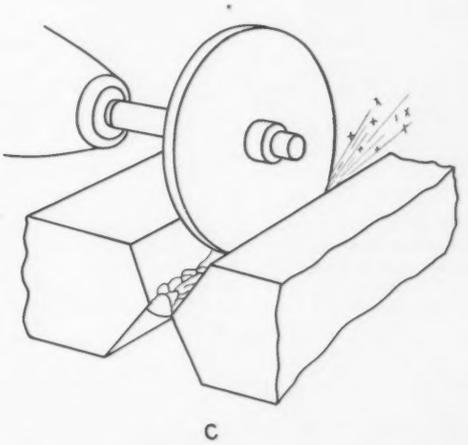


FIG. 4—The trouble with a double V plate preparation *A* is that the weld metal runs through as at *B* and the weld metal on the back side must be ground out at *C* since chiseling out is impractical on austenitic stainless steels which work harden.

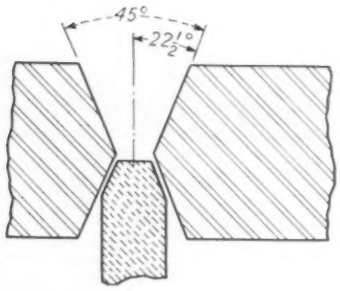
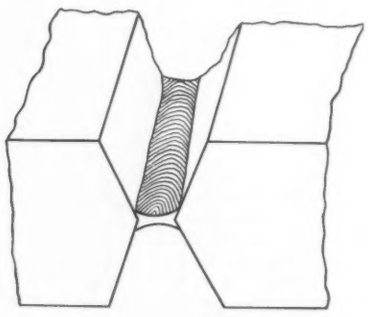


FIG. 5—Use of a copper backing bar prevents the weld metal from running through the opening left between the plates.

The double V has been used before but never had to be held to tolerances required for tank production. A certain bead technique had to be used to control warpage. With a standard root bead, Fig. 4, shrinkage takes place and that is when the plates warp. The welded part must then be turned over and welded from the opposite side. This procedure must be followed to equalize stresses. When this is done, it is possible to hold dimensions without stress relieving and machining.

Development of the root bead was very important as the root of the weld is the foundation of a good weld. First, root beads were welded with a 45-deg. included angle and an opening. This is a very impractical procedure as the weld metal runs through and the back side must be chiseled out or ground, Fig. 4C. Chiseling is very bad on stainless steel as the metal is austenitic and work hardens. The chisel just pounds against a solid formation. Grinding, on the other hand is time consuming. Relatively it amounts to 30 min. of welding and 180 min. of grinding. We discontinued the procedure because it did not lend itself to the manufacture of tanks.

FIG. 6—Appearance of top side of first bead laid down with the copper backing bar underneath, as shown in Fig. 5.



Copper Backing Strip

The next experiment of welding a root bead was with a copper backing. Two plates were set up with a 45-deg. included angle and an opening. A copper bar was then inserted in the under V and had about 1/32 in. clearance on each side, Fig. 5. It was then welded in down-hand position from the top side.

After root bead was welded, the copper bar was taken out and the root bead was inspected from both sides. Fig. 6 shows the top side and Fig. 7 the side where copper received weld metal. No grinding or chipping was necessary, and where copper received weld metal there was a concave surface formed which is an ideal condition for receiving other weld beads. There were not any voids, which make for an unsound weld, and the weld was in condition for receiving other beads by just removing the slag.

The next test of a root bead was made with a mild steel strip between a double 50-deg. included angle with an opening, Fig 8. This method eliminated weld metal coming through but left voids between the strip and the weldment. This weld obviously was not good enough because it did not have complete penetration.

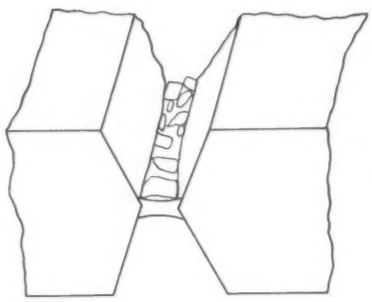


FIG. 7—Appearance of the underside of the weld illustrated in Fig. 6, showing the effect of the copper backing bar. The concave areas make an ideal surface for receiving other weld beads.

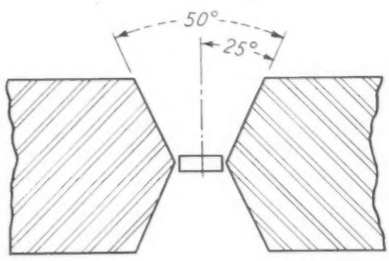


FIG. 8—As an experiment, a mild steel strip was laid in the opening between the double V plate edges. This technique was not successful.

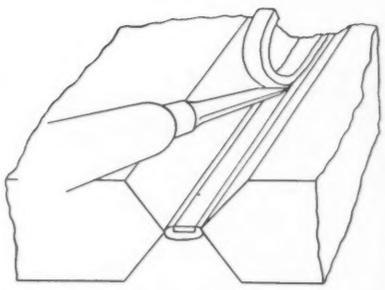


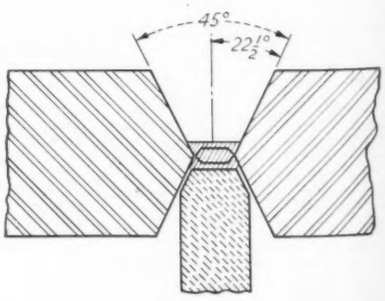
FIG. 9—Chipping out the mild steel strip after a bead had been laid on one side was tried, but was abandoned because of the difficulty of getting the strip out of corners. Flame gouging was also tried and abandoned.

It was then decided to weld the steel strip from one side and chip it out so a sound weld could be made, Fig. 9. But this procedure was eliminated because it was almost impossible to chip strip out of corners or around bulkheads in the tank. It was then thought to use a gouging tip on an acetylene torch. Gouging the strip out was better than chipping but this was difficult to maneuver around corners of the tank and it left a certain amount of carbon deposit that was a detriment to the weld. This was eliminated as not being good for production and quality weld.

We then developed a diamond shaped or oval stainless steel strip that would not have to be chipped or flame gouged. This was successful as it would lend itself to production and would also make a good weld as complete penetration was possible, using the copper back-up, Fig. 10.

Next came the problem of developing the proper bevels for welding. It was decided that a double 45-deg. included angle with an opening would be tried as it would not use

FIG. 10—Use of a diamond shaped stainless steel strip in the opening between the plates worked out successfully and lent itself to production inasmuch as no subsequent chipping or gouging is required to produce a sound base for the other beads.



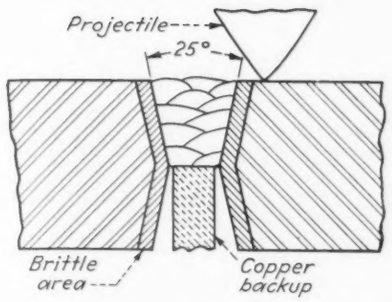


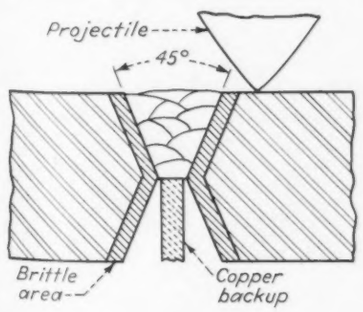
FIG. 11—This welded plate failed to pass the shock test because the angle of the surface adjacent to the weld was not great enough to prevent shearing action in the brittle area next to the weld.

excess weld metal in heavy plate. A copper back-up was used on these plates, the same as in Fig. 10. After a few H plates made with Armaweld were tested ballistically it did not look as if our welds were good enough. It was then decided to try an H plate welded with Stainweld but this plate failed quicker than the Armorweld did under shock. Most all the breakage was what is commonly known as a fusion zone break. At this time we did not really know all the factors involved in a fusion zone break.

We then decided to make other tests using Stainweld with a 50-deg. included angle with an opening and a copper back-up. After making a series of H welded plates this way, we found that the fusion zone cracks were almost entirely eliminated. The welding was done with the same welder as before and using a weave technique. That told us that the bevel used was very important when welding a high alloy armor plate with a high hardenability.

We then decided to make a series of H welded test plates with different plate edge preparation. We

FIG. 12—This type of weld passed the shock test because the angle of the surface adjacent to the weld was great enough to prevent shearing action in the brittle base metal area next to the weld.



felt that if the test plates failed, so would the tanks fail.

Effect of Plate Bevels

The first plate was prepared with a 25-deg. included bevels as shown in Fig. 11. The second plate was prepared with a 45-deg. included bevel Fig. 12. The third plate was prepared with a top and bottom bevel of 90-deg. included angle, Fig. 13. The fourth plate was prepared with a top and bottom bevel of 104 deg. included angle, Fig. 14. All H plate weldments were welded with the same rod and the same welder and all had a copper backing bar such as the figures show.

After these plates were shock fired we then knew that the bevel played a very important part in welding and manufacturing tanks. It showed that a lot of fusion zone cracks occurred because the bevel was too straight and the

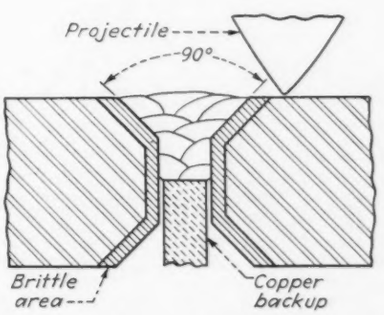


FIG. 13—This type of weld also passed the shock test for the same reason as given in Fig. 12.

hard zone at the fusion point would let go because it was almost in line with the line of shock. By keeping the hard zone from almost a direct line of fire, we achieved very good results.

These tests proved to us that no bevel should be less than 45-deg. and that if at all possible we should avoid bevels on one side and straight on the other side. Welds will generally break through on straight side because hard zone is in line with shock, Fig. 15. All tests were made with same welder and same Armorweld rod. After these tests we knew which plate edge preparation was best.

The next step was to prove what armor plate was the best for welding. Four types were agreed on. After receiving 16 plates, four from each source, we then prepared them all the same 45-deg. included bevel with a root opening. All 16 plates

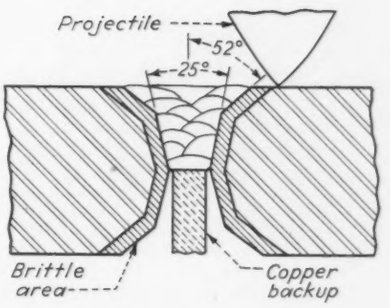


FIG. 14—This plate also passed for the same reason as given in Fig. 12.

were welded with the same welder, same Armorweld rod and the same technique.

After these tests, we were able to determine the most weldable armor plate. The tests will also help the armor plate manufacturer to make better plates for welding.

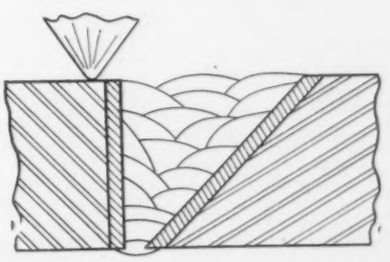
Electrodes Tested

We then decided to find out which rod was the best for welding armor plate. Again we took 16 plates but all from one source and decided to weld them as follows: Rod manufacture "A" four plates, Rod "B" four plates, Rod "C" four plates, Rod "D" four plates. After these tests were completed we then knew which rod was the best. When we had this evidence all the rod manufacturers were informed and they changed their coatings accordingly. All are supplying satisfactory rods now.

Considering the cost of such welding, savings from less rejects can only be estimated, but they more than justify any cost of extensive experiments. A few more miles obtained from each tank in actual combat may mean the winning of a crucial battle.

Based on the experience and the data from these tests, we started building fixtures and manufacturing tanks. As previously mention-

FIG. 15—Welds will generally break through on the straight side of such a joint because the hard zone created in the parent metal is in line with the shock created by the projectile.

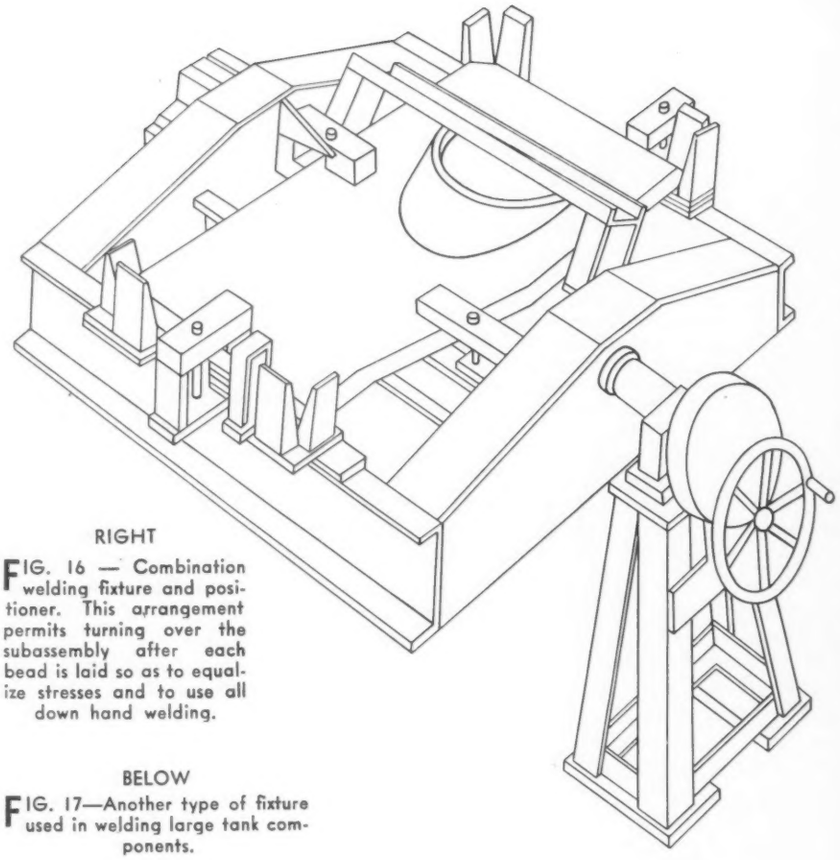


ed the one big problem was warpage and how to control it.

All the fixtures were designed so that all welds could be made down hand and that fillet and butt welds could be made from both sides. This latter requirement is necessary in order to equalize stresses. Figs. 16 and 17 show typical fixtures and positioners which permit turning the work over for welding the underside.

The first tank was welded on a surface plate and it was difficult to equalize welding from both sides. We immediately found that by neglecting the equalizing technique our dimensions were very hard to control. Also, we had welds that sheared apart due to stresses from welding more on one side than the other. From this trouble we learned that it is necessary to equalize the shrinkage stresses on all of our welds. It was then found that our dimensions were easy to hold and we did not encounter any more weld cracking or shearing from warpage or stress from welding. Each part is first made as a subassembly, then checked OK, so it can be set up in the next fixture easily and quickly.

After quality is determined, equalizing stresses is the biggest factor in welding tanks. It means you can make up subassemblies and know they will fit into the following fixture and assembly quickly. Also, when the tank is completely welded, it will stay in good condition longer. If you do not equalize the welding stresses, undue work or shock stress at some point that is already stressed to its maximum will fail. The welds break or twist to favor the stress. If subassembly methods are used, it will be possible to build many more tanks due to the fact that parts can be welded any place and final assembly involves only a few big fixtures, instead of having all final assembly fixtures. This is a very vital necessity in saving time, fixture expense, floor space and machine tools.



RIGHT

FIG. 16 — Combination welding fixture and positioner. This arrangement permits turning over the subassembly after each bead is laid so as to equalize stresses and to use all down hand welding.

BELOW

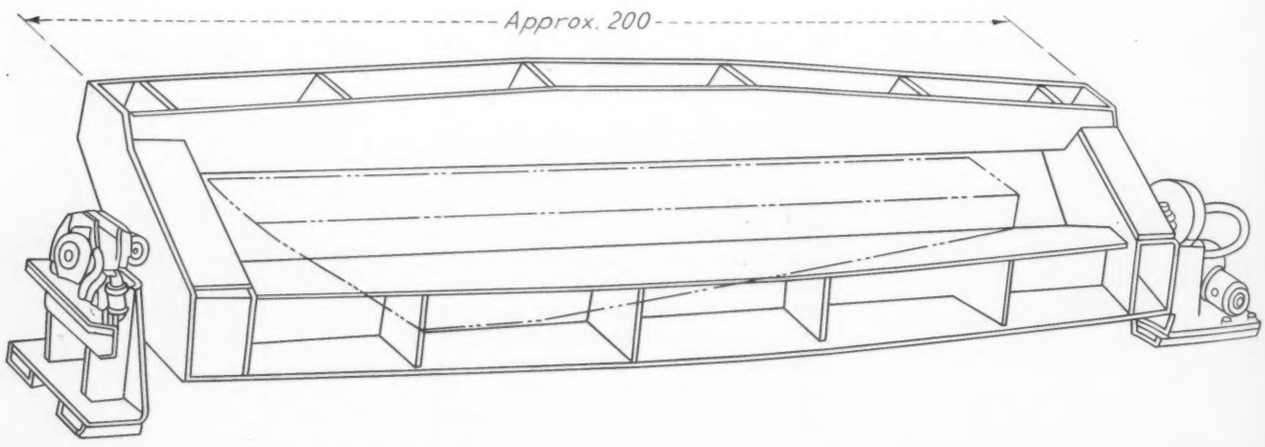
FIG. 17—Another type of fixture used in welding large tank components.

Vital Saving Made in Labor

Labor savings also can be effected as the smaller fixtures can be worked from the floor; the men must climb into the larger fixtures. Hence, in using more small fixtures and less large fixtures, welding operators will be able to weld more inches per hour. This is important as welders will be scarce. Estimated saving with this layout can be tremendous.

The main objective is to produce tanks and armored vehicles in the least time possible, and have equipment superior to any that will be met in combat. To accomplish this, the foregoing techniques were worked out and are recounted in this article for one purpose—to win. This objective can be attained by getting into production quickly and by producing faster for less money.

The real savings can only be determined by the value placed on our winning the final decision.



Steep Rock Iron Ore

By CYRUS EATON
Cleveland, Ohio

WHEN the output of the Steep Rock iron ore mines in Ontario, Canada, reaches 2,000,000 tons annually, the scrap requirements of the American steel industry can be cut more than 9,000,000 tons a year by use of Steep Rock ore. This is the judgment of one of the United States' leading metallurgists, who bases his calculations on the results of open hearth trials of Steep Rock ore recently made by a large American steel Company.

The ratio of pig iron to scrap used in the Steep Rock open hearth tests was 72 to 28, as compared with the steel industry's former peacetime ratio of 50 to 50 and its present wartime average of 55 to 45. To the excellent quality of Steep Rock ore as open hearth charge material can be ascribed the large proportion of pig iron it was possible to use; when 2,000,000 tons of Steep Rock ore are available annually, the steel industry will be able to substitute more than 9,000,000 tons of pig iron for the same amount of scrap in open hearth practice.

Governments to Assist

Present plans, in which the Governments of the Dominion of Canada, the Province of Ontario and the United States, as well as private enterprise, have a part, envisage open pit production of ore in quantity from the Steep Rock deposit in 1944. Engineers estimate an output of 1,000,000 tons for that year, with 2,000,000 tons to be produced the following year and production to be expanded as desired in the future.

The Steep Rock reserves, like the great American iron ore ranges in Minnesota, are situated near the head of the Great Lakes and, with the assistance of the Canadian Government, will have similar access to the lake shipping system and its tributary steel markets. The mines are 3½ miles from Atikokan, a division point on the Canadian National Railways, and 142 miles west of Port Arthur, a well developed port on Lake Superior. The Dominion Government owns the Canadian National and, through it, has agreed to provide a spur track from Atikokan to the mines, loading docks at Port Arthur and other facilities.

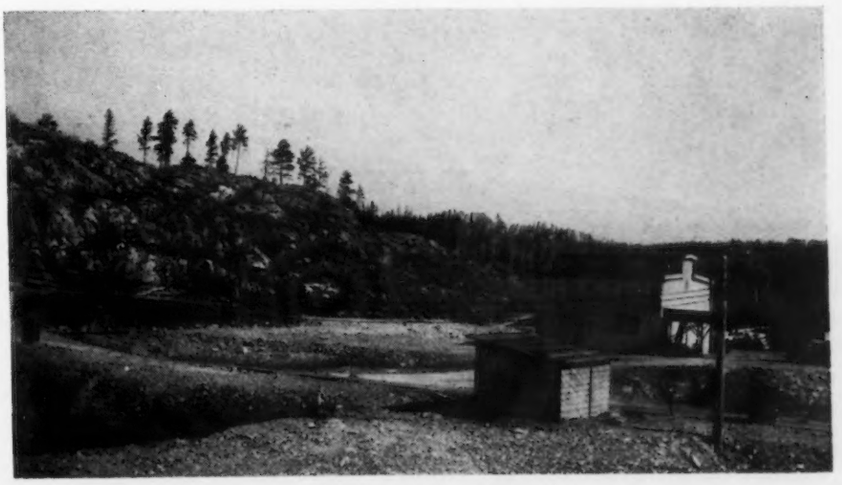
For its part, the Ontario Government, through its Hydro-Electric Power Commission, has agreed to construct a power line from Port Arthur to the Steep Rock property and to furnish power at attractive rates. Between them, the two Governments have already made initial appropriations of $5,000,000 and are ready to proceed with construction.

Financial Plans

Steep Rock Iron Mines Limited, owners of the deposits, hold 7,000 acres in fee in the Steep Rock area and, in addition, have spent approximately $1,000,000 on exploration, engineering and construction of buildings. The balance of the money required to bring the property into production will be provided in part from public funds and in part from private capital. The Reconstruction Finance Corporation has agreed to loan $5,000,000 to the Company for this purpose, and an additional $2,250,000 will be raised through the sale of a bond issue to private investors. Following the financing, there will be outstanding 5,500,000 shares of the Company's common stock, listed on the Toronto Stock Exchange. At present quoted markets, this stock has an aggregate value around $9,000,000.

Production on a commercial scale from the Steep Rock reserves will come some 50 years after attention was first attracted to the area as a potential source of merchantable iron ore. As THE IRON AGE pointed out in an earlier issue (July 20, 1939), Dr. C. B. Dawson reported to the Canadian Government in 1897 the possibility that there were valuable deposits of iron ore at Steep Rock Lake. Although the

• • • Blacksmith and steel shop at Steep Rock.



• • • Bunkhouse with capacity for 100 men. Secondary sub-station in foreground

presence of boulders of high grade hematite at a number of spots along the southerly shores of the lake held out high hopes for the many prospectors who came looking for the deposits, they all searched in vain.

Steep Rock Discovery

Around 1905 Professor H. L. Smyth, Harvard geologist, investigated the Steep Rock locality and predicted that large bodies of iron ore lay under the lake. Sporadic attempts to find the ore were made for the next 30 years, but it was not until the late 1930's that Julian Cross, geologist and now a director of Steep Rock Iron Mines Limited, instituted the search that led to discovery of the ore bodies, and the subsequent thorough exploration of them and formulation of complete plans, engineering and financial, to bring them into production.

Opening a new iron ore property in wartime naturally necessitates governmental approval for priorities, assurances of which Steep Rock Iron Mines Limited has obtained from both Canada and the United States. In the United States, moreover, the Steep Rock project has enlisted the interest and support of such varied groups as the United States Bureau of Mines, the National Resources Planning Board, the War Metallurgy Committee, the United Steelworkers of America and the Battelle Memorial Institute of industrial research, in whose laboratories careful experiments have been made on Steep Rock ore for open hearth purposes. Representatives of these agencies followed the practical open hearth trials of the ore, and have been unanimously urging that the Steep Rock deposits be put into production at the earliest possible moment.

Although the Battelle experiments were conducted for the express purpose of studying Steep Rock ore, they throw new light on the whole subject of the use of iron ore in the open hearth and, for this reason, will be widely studied in the steel industry. In these tests, Steep Rock ore was compared with leading open hearth ores; the results confirmed the fact that Steep Rock ore is highly satisfactory for both charge and feed purposes.

Battelle Laboratory Tests

The Steep Rock ore tested by Battelle analyzed 62.17 per cent iron, 0.029 phosphorus and 1.29 silica, while structurally it was hard and crystalline, and contained numerous vugs or cavities. Ignition loss tests showed that the volatiles were driven off of Steep Rock ore at the relatively low temperature of 800 deg. F., and decrepitation tests demonstrated that Steep Rock, like the other hard ores tested, does not fracture when subjected to rapid heating to temperatures as high as 2500 deg. F.

Heat penetration tests made by Battelle showed that a typical Mesaba ore, some of which under present necessities is being used in the open hearth, required more than three times as long as Steep Rock ore to reach the temperature of 1900 deg. F., while Steep Rock ore reached this temperature in appreciably less time than another hard ore which was tested. From an experiment on melting temperatures, it was also determined that Steep Rock ore had a higher softening point than the other hard ores examined.

Open Hearth Tests

The Steep Rock ore used in the practical open hearth trials was structurally the same as that studied by Battelle, and analyzed 62.30 per cent iron, 0.06 phosphorus and 1.04 silica. The practical tests, in respect to metal-ore reaction, flush slag, per cent hot metal, working of phosphorus and sulphur, per cent recovery, time of heat, and quality of steel, were very satisfactory. As already has been pointed out, 72 per cent hot metal was used, and the metal recovery was 90 per cent. The time of heat was 8 hr. and 35 min., as compared with a recent month's average of 10 hr. and 17 min. for the same furnace when other high grade charging material was employed.

Besides being eminently suited to open hearth use, Steep Rock ore makes a fine blast furnace feed.

• • • Water tower, dining hall, office and warehouse buildings.

This is not the case with most hard ores, because of their density, but Steep Rock ore combines porosity with density and thus reduces readily. The explanation for this unusual characteristic, which also accounts for the excellent performance of the ore in the ignition loss, decrepitation and heat penetration tests made by Battelle, lies in the elliptical vugs or cavities found throughout the ore, in sizes varying from microscopic dimensions to ½-in. spans. The presence of these vugs everywhere permits the ready entrance of heat into the whole body of ore so that less heat is required for reduction, and also provides outlets for the escape of superheated steam as the heat is first applied.

Market for Steep Rock Ore

With the steel industry feeling the pinch from both a shortage of scrap and a scarcity of open hearth ore, whether natural hard lump or sinter, nodules and other substitutes, there should be a great demand for Steep Rock ore when it reaches the market. Since it will be the only open hearth ore produced in North America by low cost open pit methods—all others either come from underground mines or must be prepared for open hearth use by costly treatment—Steep Rock ore will be available at attractive prices.

Arc Welding Brass and Bronze Castings

BRASS and bronze castings in great numbers are being used for vital parts in war machinery. In spite of the careful work of founders and machinists, sometimes mistakes result in defective or damaged castings. The salvage of material and labor in these castings is an important contribution to our War effort.

Many defects in brass and bronze castings are not discovered until they are finish machined. Because of the high pre-heating temperature required for gas welding, the use of this method of welding for making repairs is impossible at this stage of production, according to a technical bulletin issued by Ampco Metal, Inc., Milwaukee. The high temperature obtained in gas welding brass and bronze castings would usually cause distortion and, not infrequently, actual cracking of the part. Brass or manganese bronze castings, high in zinc, are particularly difficult to repair.

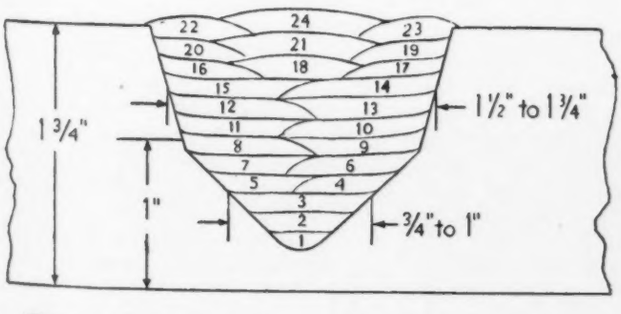
In maintenance work also, where new brass and bronze parts are hard to get or deliveries are slow, the use of Ampco-Trode 10 electrodes enables the part to be placed back into service without undue delay.

Castings of brass and manganese bronze may be repaired without preheating by metallic arc or carbon arc welding, using Ampco-Trode 10 electrodes or filler rods. With these coated aluminum-bronze weldrods, welds can be made which will match the base metal in strength and hardness, and equal it in corrosion resistance. Close color match between the base metal and weld metal will also be obtained.

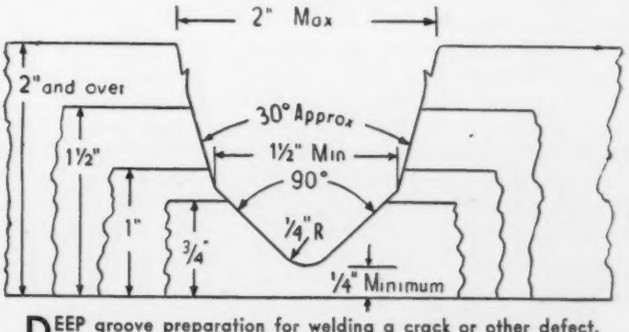
The procedure recommended by Ampco for making such repairs is very simple and requires only the usual DC arc-welding equipment. Small castings or thin sections need not be preheated at all, but it is helpful, though not necessary, to preheat heavy sections to approximately 150 deg. to 350 deg. F. The defects to be repaired should be chipped out with the sides sloping from 30 to 45 deg., to permit easy access to the bottom of the repair. Large repairs on rough or only partially machined castings may be made with a metallic arc; but for smaller repairs and particularly those on finished parts, carbon arc welding is to be preferred. When carbon arc welding, there is no danger of spatter damaging finished surfaces, and the deposition of the weld metal can be more accurately controlled.

When starting a metallic arc welding repair, it is important to establish a pool of aluminum bronze on the base metal as soon as possible, after which the arc can be maintained on the aluminum bronze and the weld continued from there. It is important to use the largest size electrode consistent with the thickness of the base metal.

For carbon arc welding the same preparation of the part should be made, and when the weld is started it is also necessary to immediately establish a pool of aluminum-bronze weld metal from which to work. If the defect is deep, relatively thin layers should be deposited, with each weld being thoroughly cleaned before the following layer is deposited. For carbon arc welding on cold brass or bronze base metals, fairly high welding currents are used. Regardless of the size of the casting, it is not often that any current less than 200 amp. will be satisfactory, and as high as 400 amp. may be required if the casting is very heavy and the defect large.



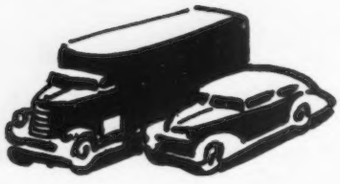
THE large number of beads required to fill a deep groove may be deposited as shown. This procedure avoids excessively wide weaving.



DEEP groove preparation for welding a crack or other defect. Not to be used for butt welds, except when it is impossible to weld from both sides—in which case a deeper groove should be used and backing employed to insure complete penetration.

Assembly Line . . .

• SAE convention develops new information on metallurgy, production . . . Meanwhile, administrative frowns deepen as CMP becomes more complicated.



DETROIT—The engineering community took short respite from its labors last week and appeared in force at the annual meeting of the Society of Automotive Engineers, concentrated on war engineering. It was a full program, with the impact divided between production, development, maintenance and use of equipment, mainly military, some civilian.

High points of papers not previously reported in THE IRON AGE (Jan. 14, 1943, Page 63), included these:

The deep drawing of steel cylinders in extremely high accuracy is the essence of production of steel cartridge cases, said Lt. Col. H. R. Turner of Ordnance. Corcoran & Brown Lamp Div. of Electric Auto-Lite collaborated with the American Rolling Mill Co. to develop a steel of fairly simple chemistry, producible with comparative ease, which could be utilized for cartridge cases. Many producers of cartridge cases today utilize a process on such steel wherein the blank is formed into a cup and the cups are drawn by conventional methods to cylindrical sections of sufficient size to produce the finished case. Following that, cylindrical structures are formed in tapering dies to the final shape. The accurate shape of the head of the case is then machined, and mouth excess is cut off to proper length. Spaced through the drawing operations are annealing processes and, finally, stress relieving.

Buick has a very interesting process which starts with a slug of steel cut from bar stock. This piece is heated and forged in two operations into a cup from which the finished case is drawn. The Ingersoll Steel & Disc Div. of Borg-Warner also uses hot methods to produce the cup, making use of Torbend machines. In this process a disc of steel is heated and rolled in circular rolls to produce a portion of the conformation of the case prior to cupping the piece for a form ready for cold work. A third process developed by McCauley Metal Products, Buffalo, starts with a disc stamped from sheet and the disc is then formed directly into a cup in a single operation at comparative high temperature. The balance of the job is produced by cold work methods.

DETAILS on the forming of the cups were withheld. In fact, another paper on steel cartridge cases by R. B. Schenck of Buick was deleted from the program as restricted material.

Harold S. White of Oldsmobile Division told how his company achieved uniform surface standards on 120 Bofors 40 mm. gun parts sub-contracted throughout the country to 50 concerns. No actual requirements beyond visual standards were set up for most of these surfaces by Ordnance arsenals, and in addition, few of the sub-contractors had surface measuring equipment.

Olds, therefore, devised reference bars finished to six standards showing minimum requirements for these surfaces. In addition, photographs were taken in pairs showing all surfaces of each part farmed out. The finish bars and the photographs were sent to all sub-contrtactors, prototypes of measuring bars having been approved by the arsenals involved prior to distribution.

Negatives of the photographs, incidentally, were treated with cross hatched film, one type of cross hatching for each finish, and this film was gummed on to the negative backs in the appropriate places. Lithographs from this film then showed by cross-hatch key all surface finishes required.

Col. H. H. Zornig of Ordnance outlined metallurgy specifications on shells. As regards shells for 60 mm. and 81 mm. mortars, unit stresses in the walls are so low, he said, they permit the specification of minimum physical properties attainable without heat-treatment for steel containing about 0.10 to 0.20 per cent carbon and 1.00 to 1.30 per cent manganese without any other alloying elements. Quantity of steel required for production of HE shell for larger rifled weapons was said to be so great that the inclusion in its composition of alloying elements other than residuals and a little manganese, up to 1 per cent, cannot be tolerated. In addition to limiting the composition of the steel to a carbon content of not more than 0.60 per cent to 0.65 per cent, the phosphorus content is limited to not more than 0.55 per cent to prevent brittleness at low temperatures, and the silicon content must be held between 0.15 and 0.35 per cent to insure that the steel is fully killed.

COL. ZORNIG said that he had found nothing to indicate that satisfactory H. E. shell bodies cannot be made of formed forgings of properly made re-sulphurized steel whose sulphur content does not exceed about 0.12 to 0.15 per cent. But, he pointed out that manufacturing difficulties have provided disadvantages to the point that sulphur content of the steel for forged shell bodies has been limited to a maximum .055 per cent.

First authorized mention of America's heavy tanks came from Col. E. L. Cummings of Ordnance. His slides included an illustration of the M6A2, which was described as carrying a 3-in. gun, a 37 mm. semi-automatic gun, a .50 cal. anti-aircraft gun and other smaller armament. As to its physical characteristics, Col. Cummings contented himself with saying that it had "plenty" of armor protection.

He estimated 25,000 civilian engineers and draftsmen were working on Ordnance requirements, and stated that besides Aberdeen, combat vehicle testing was going on at the Packard proving ground near Detroit, and at the General Motors Milford, Mich., and Phoenix, Ariz., proving stations. He said that negotiations were in progress to utilize the Studebaker proving ground in Indiana. Other test work is proceeding at Camp Seeley, El Centro, Cal., at a winterization testing camp, and at Fort Knox.

This speaker remarked that although our alloys are much lower than those presently used by the Axis, they withstand ballistic shot much better.

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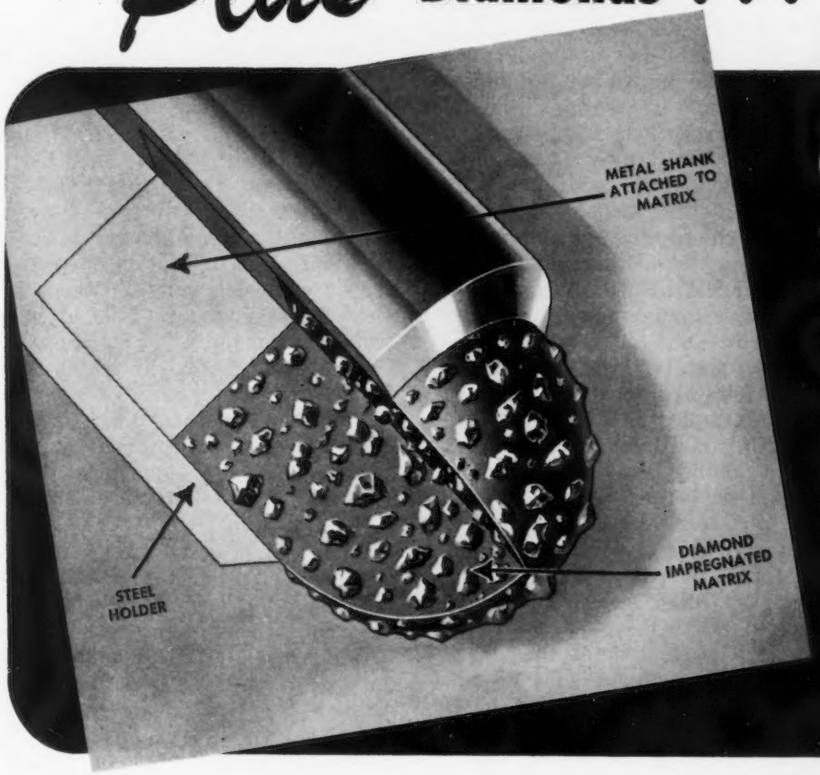

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government arsenals represents less than 5 per cent of the Ordnance requirements today was made by Maj. Gen. L. H. Campbell, Jr., Chief of Ordnance at the annual dinner meeting. He reported that more than 80 industrial integrating committees had been formed and added that he was proud to say "how much industry has helped us."

Gen. Campbell had at least two other observations of general interest. One was the fact that captured enemy equipment indicates that the Germans are fast going into carbon steel out of the alloy ranges. Another was that U. S. troops are now operating in 43 theaters of combat.

THE very interesting proposal that power plants of warplanes of the United Nations be made to international standards, readily interchangeable between fuselages, was set forth by Dr. Sanford A. Moss of General Electric Co.

He proposed the power plant be built to form the whole front section of a nacelle, comprising an assembly of engine, turbo-supercharger, generator, propeller and accessories and plan so as to be attached to a standardized nacelle firewall in any British or American plane. He cited advantages of ease and speed of replacement, rapidity of production and elimination of many current complications.

In his valedictory, retiring President A. W. Herrington laid emphatic stress on factors which he said would make a post-war return to isolationism disastrous. Possibly the best comment of his speech came from a newspaper reporter after the meeting who said: "If Cordell Hull or Henry Wallace had delivered that speech it would probably be in headlines tomorrow morning all over the country."

Mr. Herrington said that within five years after the end of the war, aircraft development would be so advanced that the United States would never be able to depend on any other nation to act as a buffer until it prepares for war. He asserted that enemy planes could then bombard our essential industries out of existance in a few hours after another war began. He urged vigilance against the tide of isolationism which prevailed before the war and which, he maintained, was already showing some signs of revival concurrent with better news from the battlefronts.

While the engineers pondered progress, administrative executives were looking more and more askance at developments on the Controlled Materials Plan. The increasing size of the list of products in Class B, the multiplying numbers of forms and regulations, the increasing exceptions to the general rules, and the day by day changes in planned workings of CMP are combining to raise questions whether the program is not rapidly progressing toward the point where its unwieldiness will make it unworkable. Some industry sources in Detroit—not all, however— believe the plan is already well along the way toward doom.

For example, the Aircraft Scheduling Unit met in Detroit last week with a number of prime consumers and started to set up some of its own variations on CMP. Indications were that it would administer its forms substantially different from the other scheduling units involved in CMP. The prime consumers were instructed that when they file requests for bills of materials or applications for A or B products, they should insert after the form number the letters "ASU" in parentheses as a means of indicating quickly that this is one of the Aircraft Scheduling Unit cases.

THIS same meeting learned that, at least for the time being, manufacturers of 11 aircraft components will henceforth be treated as prime consumers and will receive their allotments directly from the Aircraft Scheduling Unit rather than from the manufacturers of the final assemblies for which they are producing. These products are: airframes, engines, propellers, wheels and brakes, struts, skis, catapults, arresting gears, turbo-superchargers, turrets and pontoons. Of these, skis, turrets and pontoons have been on the B list.

In addition, the Aircraft Scheduling Unit appears to have decided that it will want summary bills of materials covering not only the controlled materials but all others as well. These summary bills of material call for listing of sizes, specifications and froms—in which materials are purchased. Considered in industry a rather rough means of arriving at requirements, these summary bills will supplement some work already done in more detailed manner.

Some talk is heard of classifying a number of products now listed in the B lists as Class A products, and reporting them only on form CMP-3, which does not require a breakdown of the materials needed. The claimant agencies involved would utilize information in their files to figure out the overall volume of materials required. This would quite naturally relieve prime and sub-consumers of much of the paper work they would otherwise have to do, inasmuch as not all of them have bills of materials details in their files now.

The prospect of mounting paper work is disturbing to manufacturers here, particularly when it is realized that when CMP begins to function in earnest it will require a corps of accountants to keep track of the actual flow of materials, utilization and disposition. In many companies, particularly the smaller ones, office machinery on hand is already being utilized to the utmost and the only way to superimpose more paper work on it is by installing night office shifts—an expedient already discussed in several quarters. However, there remains the problem of staffing such night shifts. Even though fairly capable clerical help may be obtainable (and there is some question whether it is) many of today's forms are so involved that specialized training is necessary before personnel can function with them, and even then a degree of expert supervision is necessary. This would seem to doom night shifts as a near term expedient.

"We haven't had a day's absence since she was put in this department"

How Tool Shapes can cause hardening hazards

When a tool breaks **hours of skilled tool making time are wasted. Whether it is a tool that cracked in the quenching tank, or a die that let go on the press, valuable *production* time is lost. Premature tool failure can often be traced to some oversight in the relation of tool design to heat treatment. We are passing along the following suggestions to help you avoid tool shapes that cause hardening hazards and premature tool failure. They may be of help to the men in your tool room.**

Heat treated steel has a certain strength depending upon the analysis of the steel, the quality of the metal, and its heat treatment. Sometimes just the internal strains set up in heat treating exceed the strength of the metal, and the tool cracks before it sees service. Or, if you get it through hardening safely, it may be so weakened that it fails under relatively light loads.

Internal strains arise from many causes, but the most serious are those developed during quenching, by reason of differential cooling of sections of the tool that are of markedly different size or mass. Thus, the differential cooling is largely controlled by the size and shape of the tool being quenched. It is wise to plan tool shapes so that the entire tool may be heated and cooled at approximately the same rate.

The angled shape here suggests a condition to avoid. It is impossible to get uniform cooling at such sharp re-entrant angles as "A" and internal strains are set up right where service stresses concentrate.

This shape illustrates a light section adjoining a very heavy section. It would be practically impossible to harden such a shape in water without cracking at the sharp corner. Even in oil, it would be difficult.

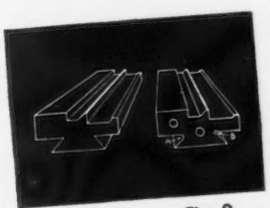

Fig. 1 Fig. 2

Figure 1 shows an undercutting form-tool that would be hazardous to harden because of the heavy and light sections joined by sharp angles. In figure 2 holes have been drilled to balance these heavy sections and "A" and "B" suggest two ways to avoid the sharp angles.

Fig. 4 Fig. 5

Another cause of warping is shown in Figure 4. The heavy rib through the center tends to prevent shrinkage and would cause the die to become oval in quenching. Drilling holes, as in Figure 5, helps overcome the difficulty.

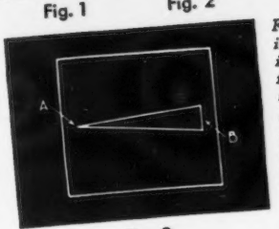

Fig. 3

Figure 3 is an oil-hardening blanking die that failed in service. It was made from a section approximately 3" x 2¾" x ½". Heat treatment and service stresses concentrated at points "A" and "B". A larger section, 3½" x 2¾" x ¾" could have eliminated failure.

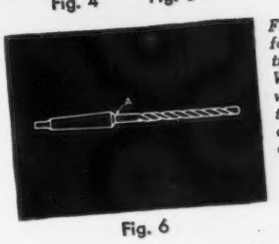

Fig. 6

Figure 6 illustrates a design for twist drills that gave trouble by breaking at "A". When a more generous fillet was allowed at this point, the trouble was eliminated and satisfactory results were obtained.

These tips on the relation of tool design to heat treatment were extracted from "Tool Steel Simplified". They represent only *a part* of the useful information in one chapter of the book. Other chapters provide helpful facts on tool making, heat treating, furnace atmospheres, quenching and many other subjects, including "trouble shooting". Get the benefit of *all* this practical information. Make copies of "Tool Steel Simplified" available to the tool-room men you want to train. Order as many as you need today.

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315 pages—205 illustrations

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TOOL STEELS

Washington .

• Industry advisory committees are becoming more important . . . Baruch strongly in favor of encouraging these groups, made up of men who are in constant contact with industrial problems.

WASHINGTON — Industry advisory committees are due to become more and more important in the conduct of industry operations by WPB. There are 465 principal committees and 48 subcommittees. These bodies composed of members of various industries have been in the process of organization ever since the days of OPM. But only in the last three or four months have they received new impetus and authority. It is predicted WPB will not be entirely successful until all industry advisory committees are fully organized and their advice and services utilized to the greatest extent.

At present, more than 160 of the principal committees meet monthly. The WPB Copper Division finds it highly useful for its industry committee to meet twice a month. Some divisions, including the WPB Steel Division, have appointed permanent resident representatives of the advisory committees to maintain liaison with the divisions at all times. Walter S. Tower, president of the American Iron & Steel Institute serves in this capacity for the iron and steel industry advisory committee.

The foremost exponent of wartime operation of industry through the advice of industry is Bernard M. Baruch, the "grand old man" who headed the War Industries Board of World War I. It is reported at WPB that Mr. Baruch has persuaded Donald M. Nelson, WPB chairman and Ferdinand Eberstadt, WPB program vice chairman, to make the committees a more potent force in WPB affairs. Mr. Eberstadt has been particularly active in sponsoring the formation and successful operation of the committees, it is said.

MR. BARUCH'S idea, WPB officials say, is that men from industry behind desks at WPB cannot possibly know the picture of current industrial conditions and needs so well as men who are in constant contact with industry. Furthermore, it is logical that the government's needs from industry can best be filled through the closest possible connection with industry. Of course, reports and advices from the committees are not mandatory for the various WPB industry divisions to adopt. Such advice may be rejected upon proper cause.

The advisory committees through their members are called upon to present to WPB studies on various problems made by the best technical brains in industry. The committees accept reports of government needs and distribute them to every portion of industry. This has the effect of preventing charges of unfairness in presentation of information of this character to separate firms or individuals. Industry members are then able to tell government officials what government requirements mean with respect to new facilities, fuel, transportation, money, labor, etc.

The iron and steel industry advisory committees have been very active during the last three or four months since H. G. Batcheller became head of the WPB Iron and Steel Division.

The committees and the WPB presiding officers are:

Iron and Steel, H. G. Batcheller; Steel Products, David F. Austin; Plant Expansion Subcommittee, Mr. Batcheller; Tool Steel, Stainless Steel, Alloy Bars and Semi-Finished Steel, W. J. Priestly; Tinplate, R. F. Sentner; Cold Finished Bars, E. B. Files; Plates and Shapes, M. W. Cole; Sheet and Strip, L. F. Miller; Pipe, Daniel Lacy; Rails and Accessories, Orrin H. Baker; Ore Subcommittee, Alex C. Brown; Scrap Subcommittee, Frank E. Vigor; Wire Products, H. M. Francis; Carbon Bars and Semi-Finished Steel, William Vosmer; Tubing, W. H. Wiewel; Steel Castings, Forgings and Armor Plate, George F. Hocker; Conservation and Operation Subcommittee, H. J. French; General Steel Warehouse, Merchant Trade Steel Products, J. R. Stuart; Iron and Steel Transportation, H. G. Plowman; Molybdenum and Tungsten Wire and Rod, T. Metzger; Cobalt, Vanadium, E. F. Hatch; Ferrochromium, Ferromanganese, Silvery Iron, Ferrosilicon, C. K. Leith; and Zircon, Rutile, Metallurgical Ilmenite, D. F. Frasche.

Press Assoc., Inc.

SELECTED TO HEAD OPA: The name of Prentiss M. Brown (above), former U. S. Senator from Michigan, was sent to the Senate by President Roosevelt on Jan. 11 for confirmation as new head of the Office of Price Administration. Brown succeeds Leon Henderson, recently resigned from the post.

SOME of the committees are engaged in active research. The conservation and operation subcommittee presided over by Mr. French, chief, metallurgical and conservation branch, has conducted experiments in NE steels. This group is largely responsible for widespread acceptance of the leaner alloys by industry and the armed services. The principal committee considers such matters as scrap collection and methods of increasing alloy steel production, etc.

WPB has had some problems in organizing and getting its committees going efficiently. To get industrialists in WPB and those outside WPB sold on the committee idea was difficult. To persuade government officials that information about proposed governmental action

would be given to industry members in advance of its completion required a good deal of talking.

At first, programs to be discussed at meetings were not sent to committee members. The result was that members attended without reports or information upon which to base discussion. For this reason and others early meetings were rather ineffectual. One trouble was that scores of government, military and labor officials insisted on attending. This insistence caused reluctance on the part of business men to "open up" and talk about industry's difficulties. Another chilling effect was the presence of stenographers.

NOW the policy of WPB is to send matters to be discussed to committee members. Committees and meetings are small, attended by 10 or fewer committeemen, a government presiding officer and six or eight other government officials. Stenographic reports are not taken but minutes are kept of the business of each meeting.

Originally, industrialists came to meetings, not only with specially prepared technical reports, but with stiff, sterile statements on the subjects they were supposed to discuss. Now, however, this is no longer true. Meetings are informal. Discussion is no longer restrained on the part of business men or government officials. One reason is that the minutes of meetings are kept as confidential information to everyone's satisfaction. Another reason is that mutual distrust between government and business groups faded upon closer acquaintance.

WPB has had to proceed cautiously in approving the formation of committees because of anti-trust laws and threat of Congressional criticism. The attorney general has ruled that no conferences with industry (whether formal committees or informal groups) can be called without notice cleared with and initiated by the appropriate assistant general counsel. Large companies cannot have preponderant representation on the committees and to prevent criticism WPB has laid down rules.

Government presiding officers must show the WPB Industry Advisory Committee Division names and business connections of proposed WPB industry advisory committeemen, together with the size of their companies (size is expressed either by the number of employees, the volume of business, or unit of production), whether they are trade association members or not and the geographical location of companies. No committee is approved unless representation is equitable with respect to company size, geographical location and trade association membership.

The following illustration of an actual committee shows how WPB is trying to make representation equitable:

Size	Industry	Committee
Large	71 per cent	50 per cent
Medium	19 per cent	25 per cent
Small	10 per cent	25 per cent
Location		
East	44 per cent	38 per cent
Middle West	56 per cent	62 per cent
South	.....	.....
West	.....	.....
Trade Association		
Member	90 per cent	75 per cent
Non-member	10 per cent	25 per cent

THE BULL OF THE WOODS — BY J. R. WILLIAMS

Cited for Award

• • • **The following** additional companies have recently received Army-Navy "E" awards for excellence in war production:

Allied Chemical and Dye Corp., Frankford Plant, Barrett Division, Philadelphia.
American Seating Co., Grand Rapids, Mich.
Anderson Brass Works, Inc., Shell Plant, Birmingham.
Arter Grinding Machine Co., Worcester.
Atlantic Products Corp., Trenton.
Bamberger Reinthal Co., Cleveland.
Bethlehem Silk Co., Bethlehem.
Black & Decker Mfg. Co., Towson, Md.
Boston Gear Works, North Quincy, Mass.
Brewster Co., Shreveport, La.
Bridgeport Fabrics, Inc., Hollis Avenue Plant, Bridgeport.
Bridgeport Fabrics, Inc., Wood Avenue Plant, Bridgeport.
Butler Mfg. Co., Kansas City.
Continental Roll & Steel Foundry Co., Duquesne Division Plant, Coraopolis, Pa.
Corning Glass Works, Corning, N. Y.
Ehrhardt Tool and Machine Co., St. Louis.
Joseph N. Eisendrath Co., Marinette, Wis.
Electronic Laboratories, Inc., Indianapolis.
Equinox Mills, Anderson, S. C.
Ford, Bacon & Davis, Inc., Arkansas Ordnance Plant, Jacksonville, Ark.
Ford Motor Co., Aircraft Engine Division, Dearborn, Mich.
Formica Insulation Co., Cincinnati.
General Motors Corp., Rochester Products Division, Rochester, N. Y.
General Power, Inc., Quapaw, Okla.
Goddard & Goddard Co., Inc., Detroit.
George Gorton Machine Co., Racine, Wis.
Hercules Powder Company, Kenvil Plant, Kenvil, N. J., and Parlin Plant, Parlin, N. J.
Hoover Co., North Canton, Ohio.
Hunkin-Conkey Construction Co. and Holabird & Root, Scioto Ordnance Plant, Marion, Ohio.
International Register Co., Chicago.
Merck & Co., Inc., Rahway Plant, Rahway, N. J.
Michigan Seamless Tube Co., South Lyon, Mich.
Morley Co., Portsmouth, N. H.
National Carbon Co., Inc., Krene Division, Bennington, Vt.
National Machine Products Co., Detroit.
Pacolet Mfg. Co., Mill No. 4, New Holland, Ga.
Perfection Steel Body Co., Galion, Ohio.
Portland Forge & Foundry Co., Portland, Ind.
Powers & Company, Chicago, and River Forest, Ill.
Revere Copper & Brass, Inc., Michigan Division, Detroit.

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Contrast this speed and this accuracy with inspection by previous methods which were not only slow but which required the highest order of gaging skill in order to maintain accuracy.

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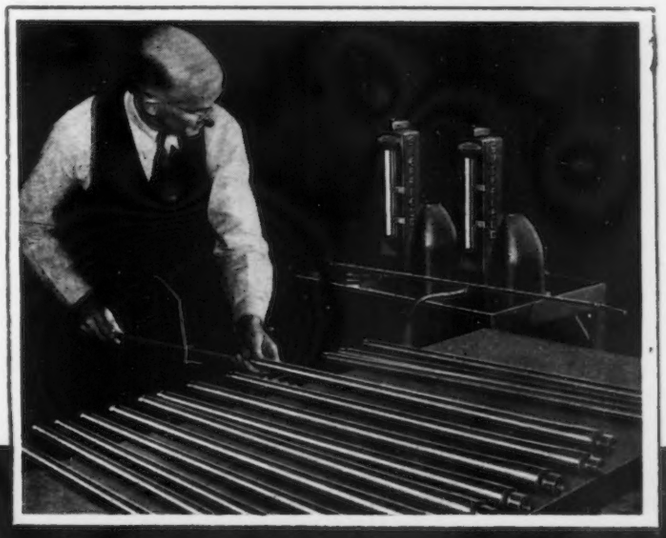

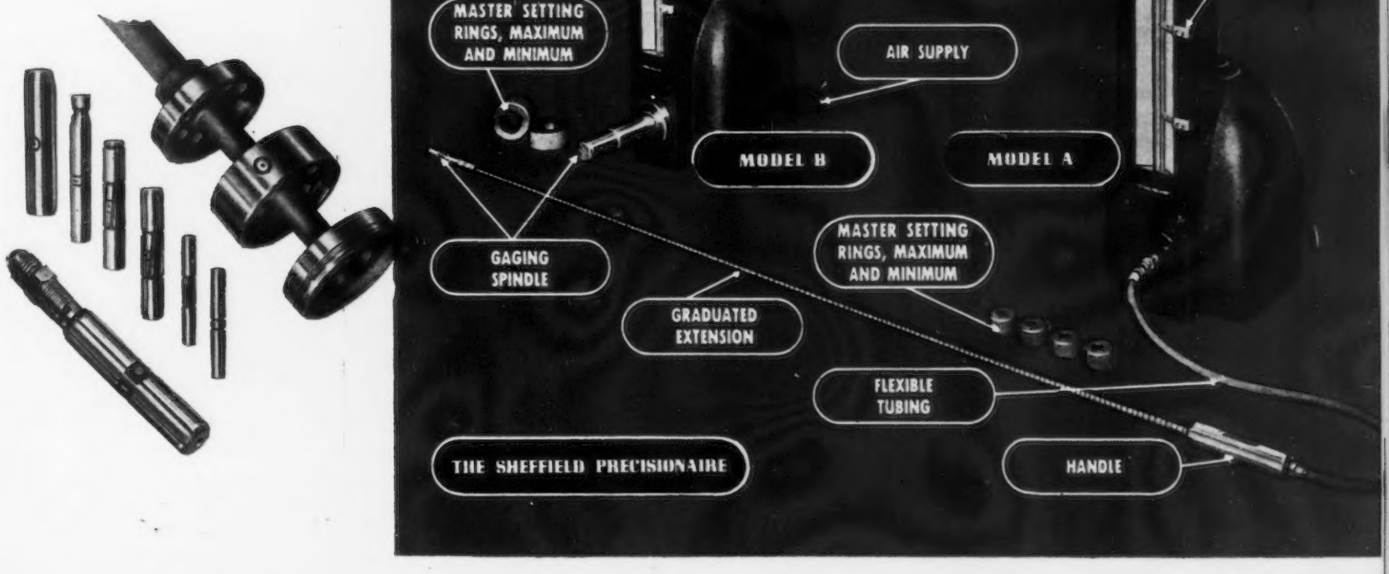

THE *SHEFFIELD* CORPORATION

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WEST COAST . . .

• Column this week discusses aspects of western iron and steel expansions, including effects of the Kaiser furnace and the hauling hither and yon of raw materials . . . Financial pattern of Coast aircraft industry analyzed.

SAN FRANCISCO—If a background of travel is prerequisite to an outstanding war record, some of the steel which arrives on the West Coast later this year will be in line for a decoration.

If plans now somewhat nebulous ever jell, the honor will be purely a result of circumstance. Pig iron production at the Fontana plant of Kaiser Co., Inc,, still is far in the van of open hearth construction which, with finishing facilities, will make this plant the West Coast's first fully integrated steel unit. Colorado Steel & Iron Corp. is experiencing a lag in securing equipment necessary for development and expansion of ore mining facilities.

Fuel for Mr. Kaiser's pig farm, which shifted in a few months' time from the production of live to metal pigs, is a product of the coal mines of Utah, some 800 miles distant. This Utah coal is coked in the by-product ovens at the Fontana plant. That is quite a distance in itself, and the resulting freight mill does not decrease the material cost for the pig iron which is tapped from the big 1200 ton stack. Just how much pig has been produced since this furnace officially was blown in Dec. 30 is not a matter of record, but the time should not be long distant when the scorecard will show 30,000 or more tons per month. Because some machinery manufacturers, whether from apathy, antipathy, or because of War Production Board orders, have failed to speed up deliveries of steel making equipment, it now appears that the big stack will be producing pig iron for several months before the rest of the mill is ready to make finished steel.

Coast foundries would be very glad to have this pig iron, because they now secure their requirements principally from the midwest, east and deep south, which adds not only freight charges but produces considerable transportation difficulties.

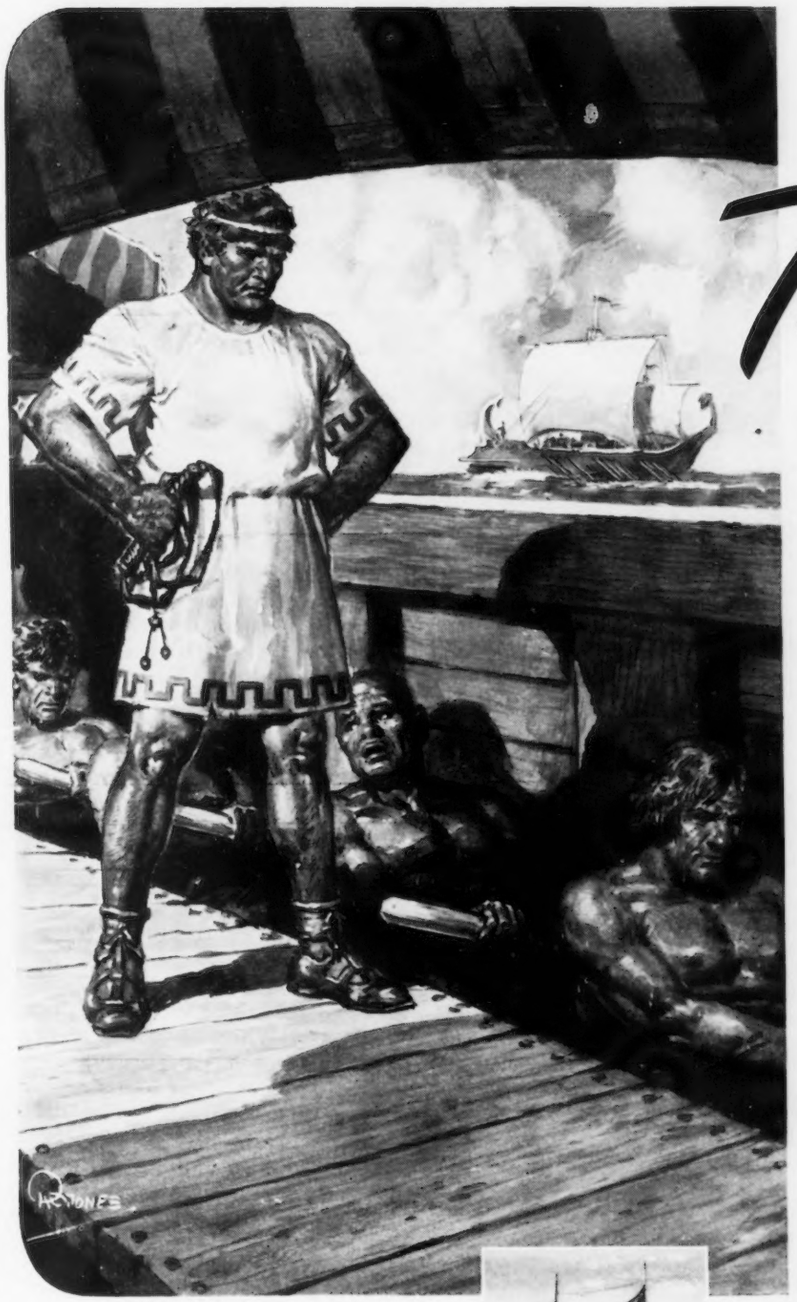
NO doubt the Kaiser Co. would be very glad to gets its foot in the door with the Coast foundry trade, for when the day comes when seagulls again roost on the big guns of the battle wagons in Los Angeles harbor, the foundries will provide a steady outlet for pig iron. However, as long as seagulls are principally valuable as meat for shipwrecked men, the furnace men must sell their iron where Uncle Sam says. If the pig iron produced in the next few months at Fontana is used by Coast mills and foundries, their scrap requirements will be proportionately reduced, and the present excess supply of scrap in this territory correspondingly increased. That would be embarrassing, and add wrinkles to the already furrowed foreheads of War Production Board officials controlling such matters.

Some 1,000 miles from the West Coast, nestling at the thither foot of the Rocky Mountains, lies the material-hungry plant of Colorado Fuel & Iron Corp. Normally depending to a large degree on mill scrap, C. F. & I. in recent months has been scouring the wildernesses of Arizona and New Mexico to feed its open hearths. Fifty per cent of the charge, however, is pig iron. And pig iron, because of the aforementioned difficulty, will not be plentiful in Pueblo.

If Utah's coal goes to California, and California's pig iron goes to Colorado, to be blended with other pig iron made from Wyoming ore, and scrap from Arizona and New Mexico, and the finished steel is shipped to the West Coast for fabrication into sea-going vessels, then the industrial isolationists of the far West at last will understand what President Roosevelt was talking about when he said the world had shrunk like a shrivelled apple. The decision whether or not this travelogue ever takes place is believed to lie largely in the hands of Alex Miller of the WPB Iron and Steel Division, who has been on the Coast ironing out a friendly free-for-all among West Coast mills, the regional WPB, the scrap processors, and in which WPB headquarters in Washington, D. C., had exercised the usual absentee landlordism.

FOR the next two or three months now, as the East Coast thermometer gets its usual shakes and shivers, West Coast plants will receive their usual seasonal attention from Washington officials and brass hats from eastern home offices. Proof that this winter travelbug is no respecter of high office lies in the visitors' register for the past week—Frank Knox, secretary of the Navy; Lt. Gen. William S. Knudsen, director of Army production; Major Gen. Oliver P. Echols, head of the Army Air Force Matériel Command; Rear Admiral Ralph E. Davison, assistant chief of the Navy Bureau of Aeronautics; Charles E. Wilson, production vice-chairman of the War Production Board.

Never people to be left out of the sunshine trek are the members of the journalistic fraternity. Thus it was no accident that the maiden flight of Lockheed's supertransport plane, the Constellation, landed a few days ago on the front page of nearly every newspaper in the nation. Designed as a super-de luxe passenger ship for Trans - Continental and Western Air, Inc., the Constellation, had war not broken out, would have carried 60 persons per ship from Coast to Coast in nine hours time long before this. The present model, powered by four 2,000 horsepower Wright engines, will be turned over to the Army. Probabilities of mass production for the duration are slight, but it will give the Army something to point to anytime anyone hollers "what we need is flying freighters," and it will provide the aircraft industry with an example of what passenger transports will be like after



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over wind and tide

Supremacy over the sea came to the swift galleys of ancient times when straining captive manpower made them independent of the vagaries of wind and tide. This power applied through long and heavy sweeps was controlled by the slave master: his lash dictated the maneuvers on which the vessel's safety often depended.

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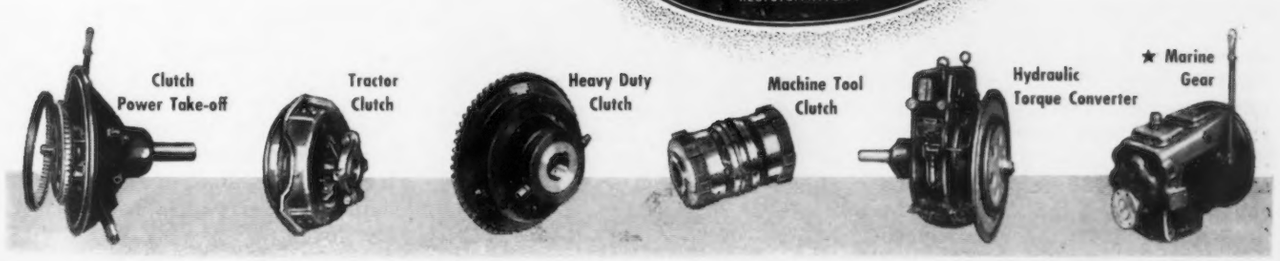


the war. The big craft's pressurized sealed cabin permits it to operate comfortably at 20,000 feet, and its ceiling is supposed to be somewhere near the 35,000 ft. mark. The "puffs" emphasize that the Constellation will fly its full load using one gallon of gasoline per mile, which is remarkable, but the very thought of which is enough to dampen the ardor of "A" card holders all over the nation. The wing of the ship is a big brother to Lockheed's P-38, but the resemblance ends right there. Lockheed's Fowler flaps are an integral part of the design. Many safety features in the ship are a dead give-away of its basic function.

THE financial pattern by which the Coast aircraft industry has reached its present production is analyzed in a current study by the Federal Reserve Bank of San Francisco. This financial story, which is based upon the financial statement of six companies for the years 1935-39 and upon the statement of the same six and two other companies for the years 1940-41, might be very suitably entitled "How to Draw Yourself Up by Someone Else's Shoe-strings." It shows how these companies, often credited with being limb-crawler-outers, are in reality financial turtles which have armored their stability against future shocks and which draw their heads in at the least sign of peril. Although the study continues only to the end of 1941, and thus deals with dollar values very considerably smaller than those involved at present, it clearly shows the financial policies of the industry. During the seven-year period through 1941, total assets of the big Coast aircraft increased by $525,000,000, but capital stock and paid-in surplus increased by only $37,000,000. Thus, stockholders only furnished seven per cent of the increase. In 1935, stock and paid-in surplus were 72 per cent of the total assets, but by the end of 1941 this proportion had fallen to nine per cent.

The most important single source of funds now are contract deposits and advances made by customers, with both War and Navy departments authorized to make advance payments in amounts up to 30 per cent of the contract price of the aircraft. At the end of 1941 these advances equalled 38 per cent of the total assets of the firms studied. The more recent trend to cost-plus contracts, with the customer billed for costs as incurred, has caused a decline in relative importance of deposits and advances as a source of working capital and has also reduced the working capital requirements. Use of bank credit has increased recently under the provisions of Regulation V of the Federal Reserve Board of Governors, which was issued April 10, 1942. Under Regulation V, either the War Department, the Navy Department, or the Maritime Commission, acting through the Federal Reserve banks, may guarantee loans made to firms engaged in essential war work.

During the period of the study the proportion of assets in inventories advanced strikingly—from 26 per cent in 1935 to 48 per cent in 1941. During the six years, inventories accounted for 48 per cent of the increase in total assets, a percentage which would be considerably larger were it not for the offset caused by applying funds received from customers directly against goods in process, and the accounting practices of the industry in treating cost plus contracts. The fact that Uncle Sam, not the companies themselves, is taking the risks in construction of greatly expanded plant facilities, is clearly shown in the analysis.

Provision is made, however, for the possibility that post-war demand for aircraft may exceed capacity of privately owned facilities, in options by which the individual companies may purchase government financed facilities or lease them.

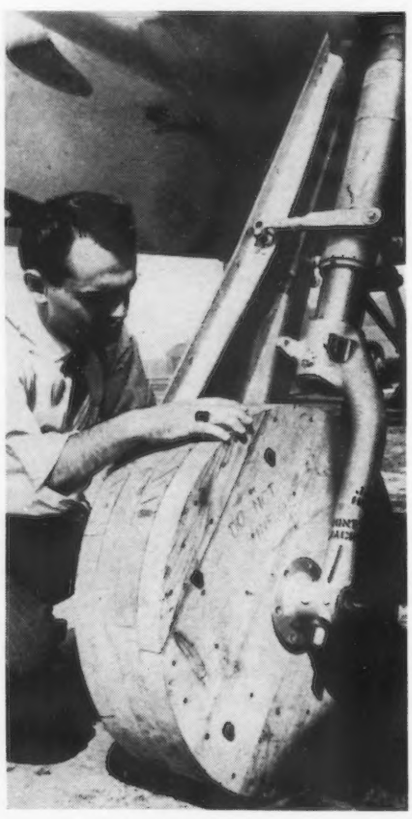
Despite zooming sales increases, the ratio of net profit to sales has been on the down grade, largely because of the profit margins on Federal orders, which now constitute the total, are less than those previously obtained on foreign and commercial sales. Cost-plus-fixed-fee contracts carry margins of six or five per cent compared to the ten to twelve per cent formerly obtained on fixed-price contracts. While the ratio of net profit to sales has been declining, the ratio of net profit to net worth has increased steadily. In 1941 the latter ratio was 44 per cent. This paradox is explained by the fact that net worth has constituted a steadily declining proportion of total assets because, as explained above, funds to finance expansion have been drawn chiefly from customers' deposits and advances and from payments on cost-plus contracts.

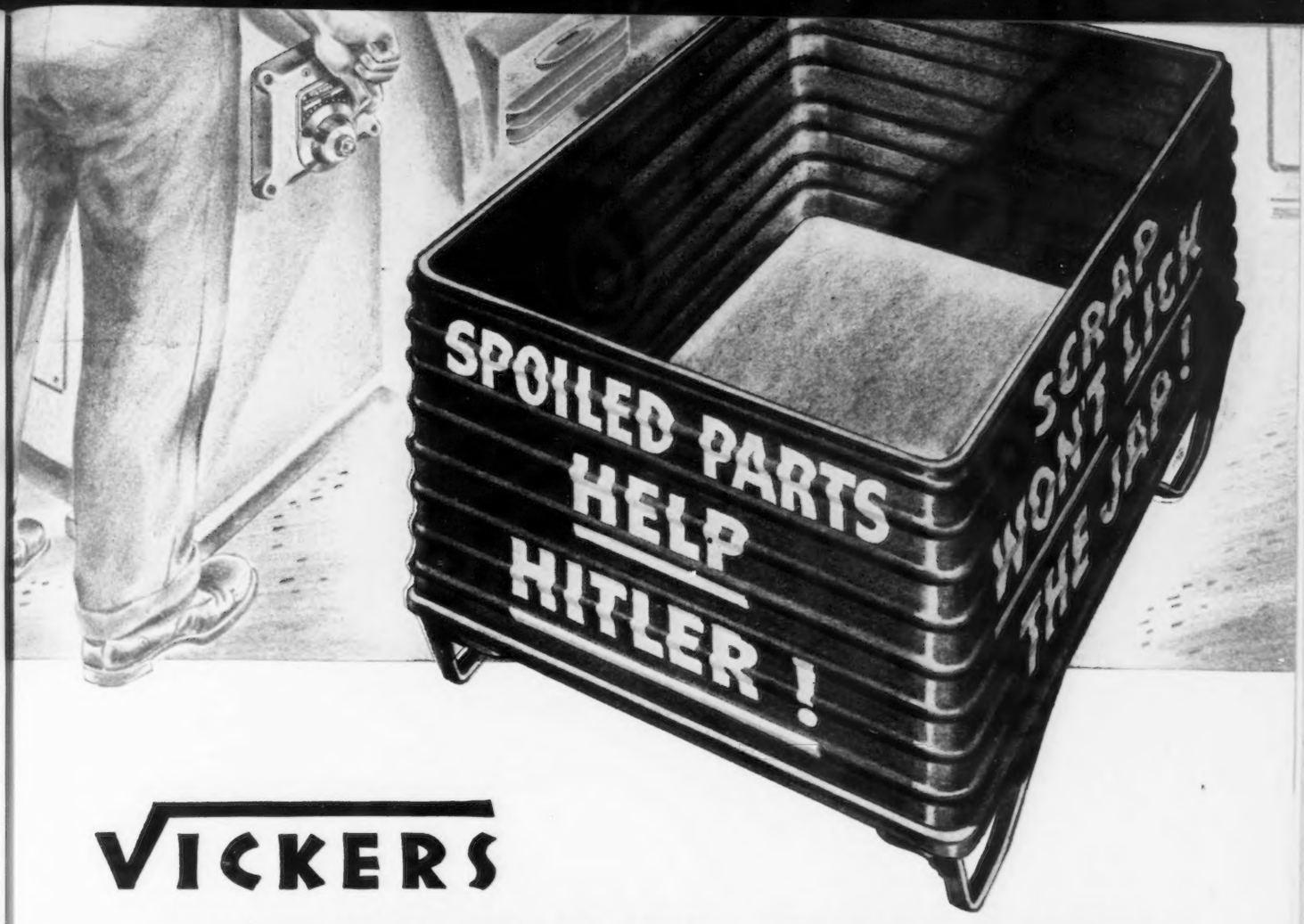
Capitalization of the aircraft firms, consisting entirely of common stock at the end of 1941, did not quite double during the preceding six years, during which time total assets increased over 26 fold. Some companies are setting up large reserves for post war readjustment purposes.

Despite these precautions and conservative financial policies, the bank's study concludes that it is "unlikely that anything the companies themselves can do will protect them should post war demands for airplanes fall to very low levels."

PEG-LEG: This is how the North American Aviation Corp., builders of fighting and bombing planes, conserves the ever-precious rubber tire. Wooden wheels are attached to the landing gear assembly of their P-51 (Mustang) fighters between their completion and their flight tests when the conventional rubber-tired wheel is substituted.

International News Photo





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Fatigue Cracks BY A. H. DIX

What Made the Mare Go

SEE PAGE 106 JAN 7 ISSUE QUOTE FEW THINGS ARE MORE TERRIFYING THAN TO SEE A HEAVILY LOADED BOMBER TAKING OFF AT NIGHT WITH A HUGE ROCKET BLAZING UNDER EACH WING UNQUOTE. USE OF ROCKETS TO GIVE QUICK ACCELERATION ON TAKE OFF IS OLD PRINCIPLE. TWENTY YEARS AGO I HAD A HORSE THAT USED SAME TECHNIQUE.

DEAC

They Put It In Writing

• • • When getting out an issue we were extra proud of, we used to write to about a thousand subscribers for candid comments. As most people are kind, the invitation was always good for enough floral offerings to do for a couple of big shot gangster funerals.

Although we put up a brave pretense of being delighted, the knowledge that we had angled for the praise gnawed at our hearts, and the bouquets brought no more joy to our nostrils than you get out of a Kresge camellia.

So this year we decided upon a daring experiment. We would hold up no applause card. We would not ask expectantly, "Ain't she a beaut?" Accordingly, the big book went out cold. Of course, we suffered agonies of apprehension while waiting. People might simply say to themselves, "Nice job," and let it go at that.

But our fears were groundless. The orchids are now arriving in bales. We won't bore you with them, but will you please look over these few samples:

A grand way to begin the New Year.—*E. James Ehret, Chicago.*

For my money, your Annual is a masterly job, both eye-wise and brain-wise.—*Herbert W. Gerlach, Horton-Noyes Co., Providence.*

A notable edition of my f. f. j.—*T. Shelby Howard, Sec'y, Howard Engineering & Mfg. Co., Cincinnati.*

Some people admire and are voluble; others are silent, believing that "silence is golden"; however, nobody can review the Jan. 7 issue without a feeling of admiration. It is a wonderful compilation. —*R. D. H. Vroom, Vice Pres. & Sec'y, H. L. Judd Co., New York.*

Some issue!—*W. A. Doherty, G. W. Griffin Co., Franklin, N. H.*

Never was a publication blessed with such kind, appreciative, and discriminating readers.

Paean In Polysyllabics

• • • One letter had us puzzled. It was from John C. (Bethlehem Steel) Long. The author of "Mr. Pitt and America's Birthright" and "Lord Jeffery Amherst, A Soldier of the King," wrote:

> Your Annual Issue is as nourishing as trophoplasm. It has pace and lively interest, and yet is apyretic.

Frankly, we didn't know whether we were being patted lightly on the back or harder elsewhere. But our drugstore dictionary, which is strong on $10 words and weak on nickel ones, told us what you already know: that Mr. Long was being generous, for *trophoplasm* is the nutritive or vegetable cell substance and *apyretic* merely means unfeverish.

Mr. Devlin Cages Some Rarae Aves

• • • But does the erudite Mr. Long know that if he meets a person who dislikes tobacco smoke he can say, "So you're one of those misocapnists?" Or that there is even a name for people who have trouble pronouncing their r's, as do Harvard graduates and Chinese? They are *rhotacists*. Does he know that in Ireland a person who accompanies lovers on walks, for convention's sake, is called a daisy-picker?

We learned all this from our 39c. dictionary, whose compiler, Joseph Devlin, M. A., has a yen for the unusual, and a contempt for the ordinary. For example, all our life we have been wondering whether *bauxite* is pronounced box-ite, bawks-ite, or boze-ite. Mr. Devlin skips it, and as we never could make head or tail of the little marks over the letters in the brains department's big dictionary, we will probably die wondering.

300 Colt Power

> A contemporary of yours prints this line:
>
> The machine operates on direct current up to 300 colts.
>
> How many horse power would this be?
>
> *Hugh Sharp,*
> *Stearns Magnetic Mfg. Co.*

The commonly used conversion rate is 1 h.p. equals 1.75 c.p. But we believe nothing is gained by the use of colts, even during times of extreme power shortage. Until mature they should be kept ohm on the range.

The Hand That Wields the Wrench . . .

> Now that you have dubbed lady welders **weldistes** (to rhyme, I suppose with **modiste**) you might be interested in knowing that Lockheed Aircraft calls its women mechanics "mechanettes." What have you to say about this?
>
> *—R. R. Kay*

Very pretty. A lady riveter is, we suppose, a riveteuse.

Squawk

> Why split infinitives when it sounds better if you don't. You say "The Society has decided to officially use the term welding operators . . ." Why not say "decided officially to use . . ."?
>
> *—George Appel,*
> *Witte & Burden, Detroit*

We didn't split it. We merely quoted the letter as it came to us, as we don't like to tamper with other people's constructions. And besides, "decided officially to use" means something different from "to officially use." When a grammatical rule gets in the way of clarity to aitch with it is what we always say.

Put Them All Together They Spell Manny

• • • We have lost the name of the man who sent us the following, which is probably the hand of fate interceding to save a beautiful friendship:

> The all-time low in legibility is held by my good friend, Carter H. Manny, of Dwyer Products, in this city. Look:

This is something new in signatures, being constructed vertically like a seven-layer cake, instead of horizontally like a steam radiator. Even though it seemed unsporting to pry into Mr. Manny's secret by approaching the signature edgewise, we did so anyway, but find that it is armored all 'round and invulnerable from every angle.

Aptronym

> May I mention that a local coal and coke merchant is named A. Smelt, Esq.?
>
> *J. P. Young, Director,*
> *W. H. Arnott, Young Co., Ltd.,*
> *Fighting Cocks Works,*
> *Middleton-St-George, Darlington, England*

Middleton-St-George—a pleasant name for a town. In the same mail a letter came in from a man in Pie Town, New Mexico.

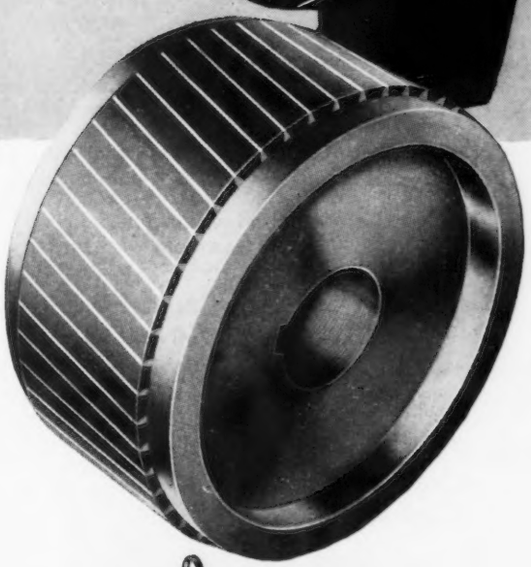
Puzzles

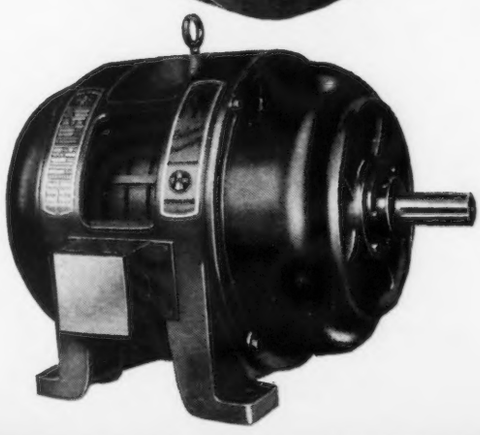
Last week's northbound motor convoy meets 14 convoys going south.

Willard E. (Babcock & Wilcox) Roth sends this in. Par is eight minutes:

> *Four soldiers are in town for a beer. Their camp is 5 miles due south on a straight highway, and 3 miles due east on a straight direct road. They can make 5 mph. on the highway, and 4 mph. across the fields or on the dirt road. What route will get the boys to camp in the least time, and what is the time?*

When You Can't Buy 'em *BIG*—Buy 'em *GOOD!*





REALLY, it's no hardship when you have to buy smaller motors. *You save money.* But remember, when you can't buy 'em big—buy 'em good.

Now that you cannot depend on oversize to take your motors through tough service—you must depend on quality.

That is why you should investigate Fairbanks-Morse Motors with *Copperspun* Rotors.

The winding of the *Copperspun* Rotor is centrifugally cast of COPPER in one piece. It provides electrical and thermal characteristics that give this motor the stamina to stand up under the most severe service without mechanical failure. You can operate a Fairbanks-Morse Motor with *Copperspun* Rotor at its full rated capacity continuously and indefinitely without fear of damage from overloading.

Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.

Copperspun

FAIRBANKS-MORSE

DIESEL ENGINES
PUMPS
ELECTRICAL MACHINERY
SCALES
MOTORS

WATER SYSTEMS
FARM EQUIPMENT
STOKERS
AIR CONDITIONERS
RAILROAD EQUIPMENT

Motors

Dear Editor:

REFRIGERATED ELECTRODES

Sir:

A short time ago there was developed in spot welding the use of a refrigerated coolant. Could you give us a list of articles related to this?

U. O. CUMMING,
President
International Service Corp.,
11 West 42nd St.,
New York City

• To the best of our knowledge, the first welding equipment manufacturer to introduce unit refrigerating machines for cooling spot welding electrodes was the Progressive Welder Co., East Outer Drive, Detroit. For a description of this equipment, see page 55 of the Nov. 20, 1941 issue. The Nov. 5, 1942 issue describes a similar refrigerating unit built by Fairbanks, Morse & Co., Chicago. In the Jan. 29, 1942 issue, Harry L. Chiles refers to the use of spot welding refrigerating equipment at Lockheed. A paper on the subject was also read last October at the annual meeting of the American Welding Society. For abstracts, see THE IRON AGE issue of Oct. 22, 1942.—Ed.

SCREW THREAD STANDARDS

Sir:

Would you please advise us where a handbook may be obtained on the types of threads being used?

P. A. LAMPERT
Dorman Products of Canada,
Toronto

• Handbook H-28, published by the National Bureau of Standards, Washington, D. C., can be obtained from the Superintendent of Documents, Washington, D. C., price 35c. For other data on screw thread fits, write to American Standards Association, 29 West 39th St., New York, which also has copies of Handbook H-28 on hand for sale.—Ed.

TOOL ENGINEERING

Sir:

In your March 20, 1941 issue, you had an article by F. W. Curtis, entitled, "Tool Engineering Applied to Tool Design."

Since we carry on an extensive training course, I am anxious to obtain 500 reprints of this article. Would it be possible to get 500 reprints?

A. J. PAUL
Caterpillar Tractor Co.,
Peoria, Ill.

• Reprints were made of the article, but the demand exhausted our supply. You have our permission to make the required number.—Ed.

HOMEWORK

Sir:

Your editorial, "Homework Without Textbooks," appearing in the Nov. 26 issue hits the spot so forcefully that we should like to send copies to our sales and service force.

R. E. SCHALLIOL
American Foundry Equipment Co.,
Mishawaka, Indiana

MACHINE TOOL PRIORITIES

Sir:

Your paragraph on page 182 of the Jan. 7 issue regarding machine tool Order E-1-b reads, "Amended order provides that preference ratings no longer have any effect on delivery schedules for the 75 per cent of machine tool production allotted to Service Purchasers."

It should have read: "Amended order nullifies the effect of the preference rating for Service Purchaser Orders which do not carry Urgency Standings."

The preference ratings continue to be effective in scheduling for any Service Order carrying an Urgency Standing. That is to say, if two orders had the same Urgency Standing, preference rating would still be effective in scheduling.

F. R. DANIELS
Waterbury Farrel Foundry & Machine Co.,
Waterbury, Conn.

• Thank you, Mr. Daniels, for this correction.—Ed.

EXPANDED STEEL FOR AIRCRAFT

Sir:

Is it possible to obtain about 100 copies of "Aircraft Fuselage Panels of Expanded Steel," by William F. Sherman, which appeared in your Sept. 17, 1942 issue?

PETER ALTMAN,
Director, Mfg. Research Dept.
Vultee Aircraft, Inc.,
Detroit, Mich.

• We have no copies available, but you have our permission to have the reprints made. This can be done economically by the offset process.—Ed.

ORCHID

Sir:

Your treatise on the subject of welding in the big Annual Number was splendidly done, and I want to congratulate you on it. You certainly have done a thorough job of reviewing the vast and complicated field of modern welding activity.

H. S. CARD
Formed Steel Tube Institute,
1621 Euclid Ave.,
Cleveland, Ohio

TOOL STEELS

Sir:

Will you please furnish me with your Tool Steel Directory and also a copy of the Tool Steel Comparison Chart in your Aug. 28, 1941 issue.

E. A. BLOUNT,
1st Lt., Air Corps
Patterson Field,
Fairfield, Ohio

MAGNESIUM SAND CASTINGS

Sir:

This office is interested in obtaining a copy of the article, "Magnesium Sand Castings," by N. M. Briskin in your July 10, 1941 issue.

N. D. FRANK,
Lt. Col., Air Corps
Office of Eastern Dist. Supervisor,
New York City

• No more copies of the article are available. However, this is one that is included in our 225-page book, "Better Foundry Methods."—Price $2.50.

BORON

Please send me two copies of the article on Boron in your Nov. 19 issue.

J. F. SIMPSON
American Cyanamid Co.,
Stamford, Conn.

Sir:

I was very much interested in your article on Boron, by T. W. Lippert in your Nov. 19, 1942 issue. Would it be possible to obtain five reprints?

KARL FRAFLUND
Farmall Works,
Rock Island, Ill.

FOOLPROOF GAGING SYSTEM

Sir:

Will you please send us a reprint of the article, "Foolproof Gaging System," that appeared in the Sept. 3, 1942 issue of THE IRON AGE. This will be for use in our Technical Library.

CLARK S. ROBINSON,
Lt. Col., Ordnance Dept.
Boston Ordnance District,
Boston, Mass.

COMPARABLE TOOL STEELS

Sir:

We are anxious to obtain 12 copies of the Chart of Comparable Tool Steel Grades. Please forward them to us with your invoice.

HARRY J. BOPP
Fisher Body Div.,
General Motors Corp.,
Detroit, Mich.

• Mailed, 15c. each.—Ed.

MUNITIONS BOOK

Sir:

We understand you have published a booklet entitled, "How To Make Munitions and Ordnance." We would appreciate it if you would send us one.

J. WILLETT
Williams & Wilson, Ltd.,
Windsor, Ont.

• "How To Make Munitions and Ordnance" is a 154-page booklet containing the principal articles on the subject that have recently appeared in THE IRON AGE. The price is $1.—Ed.

ROOTS POSITIVE DISPLACEMENT PRINCIPLE OF AIR MOVEMENT

Roots positive displacement principle is simple, consisting of a pair of scientifically designed, identical impellers mounted on parallel shafts and enclosed in a metal housing. The impellers are connected by a pair of gears and rotate in opposite directions. As the tip of one impeller sweeps past the blower inlet, entrapping a definitely measured volume of air, the other impeller is expelling a like volume. Each revolution positively discharges four measured volumes of entrapped air or gas.

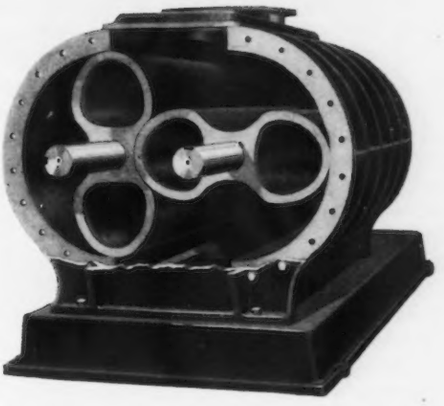
Definitely Measured VOLUME OF AIR

Roots-Connersville Rotary Positive Blowers operate equally well producing pressure or suction or a combination of the two. Displacement per revolution is fixed, with speed selected to give capacity wanted. Pressure developed is only that needed to overcome the resistance to flow of air through the system.

"R-C" Blowers operate at high efficiency at all pressures up to the maximum for which they are designed mechanically, making them particularly well adapted for variable pressures, where the pressures cannot be figured accurately, or where a pressure above or below normal is required for periods of operation.

No internal lubrication or seal is required, and the air delivered is free from oil vapors or moisture.

Drive may be from direct connected steam or gas engine, moderate speed induction or synchronous motor, or through V-belt or reduction gear set from high speed motor or steam turbine.



HIGH VOLUMETRIC EFFICIENCY

Note the large inlet and discharge openings without valves or restriction of the blower. As air velocity through the blower is no greater than in the pipe leading to the blower, loss from wire drawing and surface friction is negligible.

A pair of gears, running in oil, maintains the accurately gauged clearances between impellers measured in thousandths of an inch. Loss due to slippage is thus held to a minimum. The "know how" which enables economical production to such close clearance without internal contact is a direct result of Roots-Connersville's unequalled experience of more than 85 years.

"R-C" Positive Displacement Blowers are built in a wide range of sizes up to 50,000 CFM, and for pressures up to 15 lbs. gauge in single stage and 30 lbs. in two-stage compound arrangement.

ROOTS-CONNERSVILLE BLOWER CORP.
301 Ohio Avenue **Connersville, Indiana**

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Roots CONNERSVILLE SINCE 1854

NO PRIORITY ON BEING INFORMED

Even though priority may prevent your obtaining new equipment at present, there's no priority on being informed on the advantages of Roots-Connersville equipment. Now is the time to work out plans and problems for the day when priorities will be lifted. Write for Bulletin 22-23-B11.

Rotary Positive **BLOWERS**

This Industrial Week . . .

- ***Easing in Orders Almost Meaningless***
- ***Batt's Figures Emphasize Tight Situation***
- ***Confusion Over CMP Seems Increasing***
- ***Fencing of Shipments Move Criticized***
- ***Steel Ingot Rate Rises One-Half Point***

WHILE war production continued unabated in high volume this week, new orders in the steel industry took on a spotty appearance, temporarily at least. In the machine tool field, heavier purchases were received from airplane parts and equipment manufacturers.

Despite the easing of new business encountered by a few steel companies, most were receiving incoming tonnage heavier than their outgoing shipments. There is no overall excess of steel nor is there likely to be for a long time ahead.

Mills will be asked to roll as much steel in February as they did in January, even though February is a shorter month. This will mean heavier pressure on finishing mills and a severe test of their flexibility in view of the frequent changes occurring.

Emphasizing very strongly the tight situation prevailing in steel were figures cited this week by William L. Batt, Vice Chairman of WPB—figures showing the amount of steel available for civilian consumption will be even less than some authorities expected.

"The use of steel in civilian goods really will be cut to the bone," said Mr. Batt. "The estimate for this year is 1,500,000 tons, or 7½ per cent of 1940. The largest single item is for tin cans—774,000 tons. This represents quite a drop from the 1942 figure of 1,800,000 tons. Many foods which formerly came in tin will not have to be packed at all. The next biggest steel item for 1943 is for war housing—250,000 tons. Consumer durable goods, for which 3,000,000 tons were used in 1940, will get only 170,000 tons. A large part of that 170,000 tons will be used in repair parts for refrigerators and other appliances, and for razor blades, light bulbs, etc.

"The 1943 steel figure also includes 100,000 tons for automobiles. This includes steel needed in the manufacture of trucks and busses as well as repair parts for your car and mine.

"The stoppage of production of the many items of household convenience alone will save some 3,000,000 tons of steel and will give our fighting men thousands of tanks, planes, guns and ammunition."

MOUNTING tension over the Controlled Materials Plan also reflects the lack of ample supplies of steel and other metals for usual purposes. Industrial executives in some areas have been looking more and more askance at recent CMP developments. The increasing size of the list of Class B products, the multiplying numbers of forms and regulations, the increasing exceptions to the general rules and the frequent changes in the plan have all helped raise the question as to whether the program might be nearing the point of unwieldiness. One or two agencies have indicated they will administer forms differently than other scheduling units. The prospect of more paper work is disturbing to industries. Keeping track of the flow of materials will be no simple task, it is said, and some forms are so specialized that extensive training of clerical personnel will be necessary.

The confusion over CMP comes on top of many troublesome problems such as manpower shortages, occasional labor disputes, trucking problems and so on, all providing an unprecedentedly severe test for industrial management. The truck problem alone is reported increasingly bothersome from the standpoint of depending on deliveries. The truckers have had difficulty obtaining drivers, while equipment is wearing out and costs are increasing. The result is that some truckers are faced with the necessity of charging higher shipping prices or curtailing their services.

CANADA was facing a major crisis early this week in her war production program as the result of the closing of two steel plants through strikes. Sympathy walkouts were threatened. Canadian production of steel ingots was cut by 65 per cent, pig iron output by 55 per cent, while the loss in finished and semi-finished steel was estimated at close to 70 per cent. Canada's total rated capacity

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for production of basic open hearth ingots is 2,765,000 tons a year, and pig iron 2,123,230 net tons a year. If continued for any long period this big reduction in the Dominion's iron and steel supply will result in serious curtailment in output of leading Canadian war industries.

On our own West Coast, the war production board is attempting to solve raw material supply problems which are peculiar indeed. Henry Kaiser's new blast furnace will be making pig iron for several months before the rest of his mill is ready to make finished steel. Therefore, Kaiser's pig iron can be diverted to foundries or other steel plants temporarily. If Utah's coal goes to California, and California's pig iron goes to Colorado, to be blended with other pig iron made from Wyoming ore and scrap from Arizona and New Mexico, and the finished steel is shipped to West Coast shipyards, then the industrial isolationists of the far west at last will understand what President Roosevelt was talking about when he said the world had shrunk like a shivelled apple.

Over the nation, the lack of "hot topping" facilities at steel plants continues to be a serious barrier. Some companies which lack sufficient of these facilities are finding it necessary to take deeper cuts in ingot discards in order to meet more exacting requirements. The discards from high priced steel are piling up, since mills hesitate to use them as scrap. Billet reinforcing bar mills could use the discards, but under a recent ruling they are permitted to roll only a few sizes of bars, about 10 per cent of the going business.

Restricting delivery territories of steel mills, an idea being discussed more and more in certain Washington quarters, would create incredible confusion and impair the war program if enforced rigidly. Lack of familiarity with steel production and consumption is shown by proponents of the restrictive proposal. Steel production is concentrated in a few areas, but consumption in the same areas is below output.

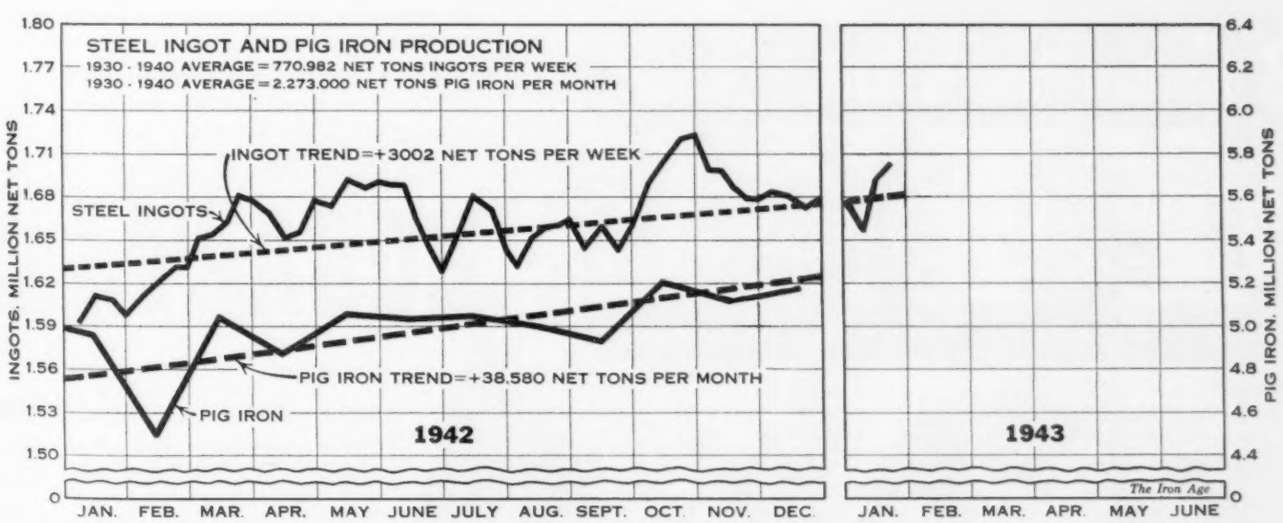
Allotment Numbers Take Precedence

Washington

• • • "While no war producer need fear that he will find himself without supplies adequate to meet his contracts, those who qualify under CMP will enjoy the advantage of allotment numbers in obtaining aluminum, copper and steel," Harold Boeschenstein, CMP Division Director, declared last Friday. Mr. Boeschenstein said direct allotments of controlled materials during second quarter would be confined to those companies which filed CMP application forms on time. Forms 4A and 4B should have been mailed during the week of Jan. 11. He said "It is obviously to the interest of every producer who can possibly do so to have his applications on file with the proper claimant agency or WPB Industry Division by Feb. 9.

Prohibiting steel mills from rolling more than one product also would work a hardship, particularly on men thrown out of work.

THIS week's steel ingot rate of 100 per cent of rated capacity bettered last week's figure by half a point. Operations in Chicago rose one point to 102.5 per cent and in Buffalo output jumped two points to 106.5 per cent. Up three and a half points is the melting rate at Birmingham, while in Cincinnati steel production increased three points to 112 per cent. Pittsburgh melting schedules declined one point to 100 per cent of capacity as did those of Detroit which this week was at 102 per cent of capacity, from last week's revised rate of 103 per cent. Eastern District operations continued to drop, falling off four points this week to 94 per cent. Continuing at last week's levels are Youngstown at 101 per cent, Cleveland at 95 per cent, Philadelphia at 92, Wheeling at 90 and St. Louis at 106.5 per cent of capacity.



Steel Ingot Production by Districts Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	S. Ohio River	West	St. Louis	East	Aggregate
January 14	101.0	101.5	101.0	92.0	95.0	104.5	90.0*	98.5	103.0*	109.0	102.0	106.5	100.0	99.5
January 21	100.0	102.5	101.0	92.0	95.0	104.5	90.0	102.0	102.0	112.0	102.0	106.5	94.0	100.0

* Revised

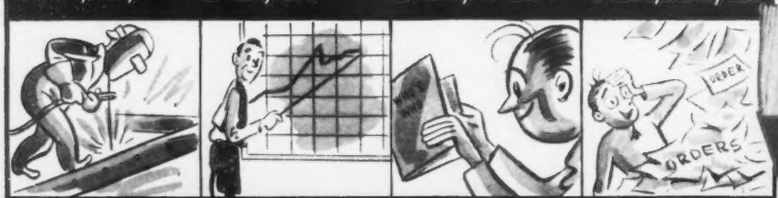
Aircraft parts are fabricated with greater speed and accuracy with this ...

Hobart

Case histories of the development of airplane structures in any aircraft plant today would quickly reveal the vital part electric arc welding is now playing in war-time plane production. Since reduction of weight is all-important, arc welding has helped make great headway on this one item alone. At the same time, strength has been increased. Not too much can ever be said for arc welding in this war effort; nor about the "Simplified" Welder that is setting the standard of performance . . .

8 Important Things to Check *when you purchase your arc welders.*

1 *Simplicity* 2 *Long Life* 3 *Ability to "take it"* 4 *Low Operating Cost*



5 *Speed* 6 *Efficiency* 7 *Who Uses 'em* 8 *How much repeat business do they get*

HOBART "Simplified" ARC WELDING

HOBART BROTHERS CO., Box IA-131, TROY, OH

☐ Send information on Hobart Welders for_____

_____ (type of w

☐ Send _____ books "Practical Arc Welding" $2.00 each.

NAME _____

FIRM _____

ADDRESS _____

CITY _____ STATE _____

REMARKS _____

ARMY E NAVY

AWARDED TO HOBART BROTHERS FOR EXCELLENCE IN WAR PRODUCTION.

HOBART

"One of the World's Largest Builders of Arc Welders."

News of Industry

• • •

Lack of Understanding Shown By Talk of Restricting Shipments

Restricting delivery territories of steel mills, an idea being discussed more and more in certain Washington quarters, would create incredible confusion and impair the war program if enforced rigidly, interviews with steel purchasers showed this week.

Lack of familiarity with the steel production and consumption pictures is shown by proponents of the restrictive proposal, which as pointed out in this magazine last week (page 60), would be aimed principally at transportation savings as one part of a broader scheme for somehow lifting steel output.

While steel production is concentrated in a few areas (almost 43 per cent of total output comes from the Pittsburgh, Wheeling and Youngstown districts) the market for every steel product varies widely. Some items are used in only a few districts and by a few buyers, who may be remote from the best source of supply.

What steel consumers and producers fear is the passage of blanket rules which might be unsympathetic to necessary relationships between users and suppliers, relationships built up after years of experience. A blanket restriction on pig iron deliveries might work hardship on silvery iron users; a rule covering "strip" might endanger the production of a remote consumer who has been dealing with a certain mill because of peculiar requirements or quantities.

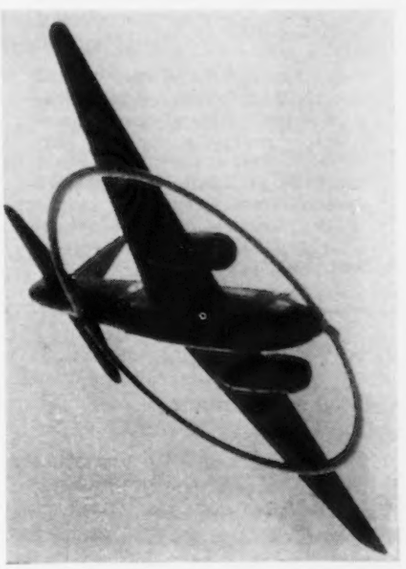
Even if modified so that accounts would not have to shift if available capacity did not exist in an area, the obtaining of relief by appeals would entail considerable paper work and worry because of the merchandising problems which would arise.

In alloy steel for the aircraft industry, tin plate, cold rolled strip, rails and armor plate the problems would be more serious than in such items as structural shapes or hot rolled sheets. On pipe, probably the greater portion of certain requirements is made in the Youngstown and Pittsburgh districts. A large producer of semifinished steel at Pittsburgh frequently is required to take large orders for shipment to distant points because other mills are unable to do so.

While innumerable cases of war work have been speeded by mills shipping long distances steel which could not be obtained in the area of fabrication, at the same time government directives and allocations often have forced mills to cross-haul needlessly. Nails made in Alabama have been shipped under government directives to the Northeastern part of the nation, and so on.

Recently, with the WPB as a clearing house, cross hauling many times has been cut by the cooperation of steel companies.

An example of the chaos which might slow the war program through rigid "fencing" of delivery territories is provided by an eastern maker of equipment used in the mining industry. Years ago, working with metallurgists of an eastern steel company, the firm developed steel for jack bits after months of experimenting. When demand for the bits grew to the point where an additional source of steel supply was necessary, months were spent educating a Pittsburgh steel mill to the requirements. Still later, a western steel company was broken in. Today, eleven heats or 880 tons per month are being produced by the three steel companies. No one of the three would undertake to supply the whole amount. If the arrangement is tampered with, the war program will suffer because the jack bits are used in mining vital metals.



British Combine Fox Photo

AIRCRAFT VS. MAGNETIC MINES: This Wellington bomber is fitted with a device for exploding magnetic mines laid by the enemy in British waters. The minesweepers of the air were equipped with a "hoop-shaped" casing extending all around them and secured to their nose, wing and tail. The casing held a magnetic cell and the current was supplied by an auxiliary engine of the ordinary Ford V-8 type. The equipment was designed to set up a magnetic current which would set off the then new type of mine.

Pig Iron Output Raised As Granite City Stack Resumes

Pig iron production was doubled at the Granite City, Ill., plant operated by the Koppers United Co. when the second of the two enlarged, relined and reconditioned blast furnaces was relighted last week. Capacity of the new furnace, which had been idle since the summer of 1930, is 600 tons per day, an increase of 100 tons over its previous capacity. The other furnace, idle since 1932, was put into production in the fall of 1941.

The Granite City furnaces, formerly a part of St. Louis Gas & Coke Corp., were rebuilt and are being operated for the Defense Plant Corp. by Koppers United Co. Some of the iron is being delivered in a molten state in special railroad ladle cars to the nearby Granite City Steel Co. The furnaces are being operated with ore from the northern ranges and with as much Missouri ore as is available.

Training Personnel for New Positions Aided by TWI Methods

Cleveland

• • • **Organized nearly** two years ago on a national scale, the Training Within Industry service of the War Manpower Commission has aided more than 7000 war plants employing some 6,000,000 men and women. Training Within Industry (TWI) is geared to train plant supervisors, foremen, lead men or sectional chiefs in teaching plant operations to new workers. The product of one phase of the TWI program is "job instructors," made up of workers in the various plants in which TWI has held training sessions.

In the Northern Ohio district alone, TWI has trained instructors in some 650 companies employing nearly 550,000 men and women. Up to the present time, in this area some 26,000 persons have been trained as job instructors, representing practically every war plant and producer of war goods of any consequence in the district.

In fast-expanding war manufacturing plants it was early discovered that peacetime training courses could not cope with the heavy influx of new workers and new jobs.

Training Within Industry is not confined to training job instructors, but at present that is the main aim since needs are most acute in this phase. It is also equipped to render specific advisory assistance to industries in starting or bettering the training program they carry on within their own plants. Use of TWI service is purely voluntary with the manufacturer, TWI representatives coming in only at the manufacturer's invitation. The plan is variable enough to adapt it to fit the conditions of each specific plant. Training needs are first identified and recommendations of training programs are made to fill these needs. TWI aids in setting up such a program within a plant.

The TWI division also conducts training programs for supervisors and training directors. To train supervisors as job instructors, a training period of 10 hours is required, after which time such supervisors are fully qualified to transmit the "know how" of operations to new personnel. Also, a 32-hr. period of intensive TWI study aims at training directors of these job instructors so that after TWI has completed the work in a plant, more job instructors can be trained in the plant to meet growing needs.

The services of TWI are divided into four categories: (1) *Job Instruction Training*, the main phase thus far, is designed to show the supervisor how to train or break in men on new jobs; (2) *Job Methods Training* shows the supervisor how to simplify and improve methods of doing a particular job; (3) *Job Relations Training* is a phase of the program that is still pretty new and will attempt to show how to work with and deal with workers at the job level to gain cooperation, promote teamwork, and increase production; and (4) *Training of Training Directors*, as the name implies, gives intensified coaching in how to operate and improve complete, plant-wide training programs.

The TWI division is made up of some of the best known personnel and employee training directors in the country. For example, the Washington headquarters is staffed by C. R. Dooley of Socony-Vacuum Oil Corp.; Walter Dietz, of Western Electric Co.; M. J. Kane of American Telephone & Telegraph; and William Conover, of U. S. Steel Corp.

Recently, the Army Air Force reported to the Northern Ohio Training Within Industry division that production of a certain plant that was making aircraft parts was not satisfactory in one division.

After TWI had completed its program at this plant, it was found that the average daily production for the two best months preceding the inauguration of the training program was doubled for five days running within six weeks from the time that TWI was consulted. Considering that it took two to three weeks to train the instructors, hire the new personnel, and generally get the program under way, the actual time required to double the production was well within three weeks.

The Training Within Industry program has also brought to light some of the better training programs used in various industries. For example, programs developed by Thompson Products Co. entitled "Upgrading In A Rapidly Expanding Plant"; Remington Arms Co.'s "Organizing Manpower for a Small-Arms Ammunition Plant"; and the "Training for Arc Welding and Acetylene Burning in a Shipyard" plans developed by an unnamed shipbuilding concern, are typical of many that have successfully met the problems of war industries.

The government itself, as well as the armed services, has adopted the Job Instructor Training program of TWI. Since arsenals, ordnance plants, Quartermaster Corps, etc., employ some 900,000 civilians, TWI was called in to train supervisors and foremen of these units of the Service of Supply. Similarly, the Navy, Civil Aeronautics Administration, Federal Public Housing Authority, and many other branches are using Job Instructor Training.

Plane Patterns Made Upon Printing Presses

Buffalo

• • • **Plants of the Curtiss-Wright Corp. Airplane Division have "slashed man hours and materials by 85 per cent" in making steel patterns for airplane parts by using printing presses, according to Buffalo plant officials.**

J. A. Williams of the division staff says the new process "is smashing one of the major bottlenecks in the production of planes. It is of extreme importance because subcontractors are being called upon in greater numbers to help turn out planes."

An inexperienced crew turned out 27,284 template copies in the first seven weeks of operation of printing presses to transfer patterns to steel sheets. Five other methods of duplicating pattern designs have been used in the plane industry, three of them photographic, one electrolytic and one x-ray.

Herman L. Weckler

World Wide Photos

Donald W. Douglas

Ferdinand Eberstadt

Victory Producers . . . . . A Post-War Planner

• • • Producing for victory is Herman L. Weckler, vice-president and general manager of Chrysler Corp.'s new Dodge Chicago plant where airplane engines of tremendous horsepower will be produced in a building larger than even Ford's Willow Run plant. He directs 80,000 war workers. Producing too for a winged victory is Donald W. Douglas, head of Douglas Aircraft Co., Inc., who has been responsible for much of our aeronautical progress and builds the big B-19 bomber and four-motored C-54 transport along with many other types of military craft. Riding herd on the WPB is Ferdinand Eberstadt, vice-chairman of the WPB program determination committee and requirements committee. His is the job of getting $100-billion worth of war materials produced. When these men have helped bring about the victory, Paul G. Hoffman, post-war planner, president of the Studebaker Corp. and head of the committee for Economic Development, will have a plan ready to maintain the standard of living and perhaps preserve the world's peace.

Paul G. Hoffman

Counter-Rotating Propeller Makes Initial Test Flight

East Hartford, Conn.

• • • The first flight of an American counter-rotating propeller of the constant-speed type was made from Rentschler Field last week, as Hamilton Standard Propellers division of United Aircraft Corp. unveiled the result of eight years development. It was also the first flight in the world of a feathering counter-rotating propeller.

The device consists of two three-bladed propellers (each 12 ft. in diameter) mounted one behind the other on co-axial shafts and driven by one engine. One propeller turns clockwise, the other counter-clockwise.

The added horsepower in engines and super-charging for high-altitude flying in more recent years meant that blade area must be increased if efficiency were to be maintained. A certain amount of area could be obtained by increasing the width and length of existing three-bladers and by increasing the number of blades to four. But there was a limit on all three of these.

Use of the counter-rotating propeller solves three basic problems. It gives the increased blade area without increased breadth or length. It removes the torque reaction, or twisting effect, developed by a single propeller rotating in one direction. The handicap of this torque reaction is particularly great in the small, high-speed, fighting planes operating at high altitudes. A certain amount of rotational energy in the slip stream of the front propeller is also recovered by the second propeller and converted into useful work and the slip stream straightened out to lessen resistance to the plane.

Briefly Told—

• **The Pontiac Motor Division** has cut the original production time scheduled for parts manufacture for Oerlikon 20-mm. cannon in half, it was reported by Harry J. Kingler, general manager. Machining of the Oerlikon breech case now requires less than 65 hours against 190 previously. Time required for barrel rifling has been reduced by 73 per cent, for miscellaneous small parts, 61 per cent. Trigger cover plates, formerly produced from a steel forging weighing six lb. are now stamped out of steel, followed by a welding operation. The steel saved has run two lb. per piece and in the reduction of operations from 29 to 15, about 9/10 of the original cost has been saved, it was said.

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• **The Magnus Chemical Co.,** Inc., Garwood, N. J., manufacturers of industrial soaps and allied products, has issued a new illustrated booklet entitled "Railroad Cleaning Handbook," discussing problems connected with practically every division of the railroad industry.

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• **The WPB and the National Machine Tool Builders Association** have requested the American Standards Association to start work on a standard color code for lubricants. Purpose of this standard will be to indicate by color the grease or oil to be used in a given part of a machine, thereby preventing costly mistakes on the part of the operator.

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• **The Majestic Co.,** Huntington, Ind., manufacturer of metal building necessities, recently put into operation a new plant, located in the same city, completely equipped for producing aluminum castings by a special permament mold process. The new company will be known as The Majestic Aluminum Co.

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• **Arthur G. McKee & Co.,** Cleveland, industrial plant and equipment engineers and contractors, state that the dollar volume of new contracts taken in 1942 was greater than for any previous year except 1941. Design and construction of plants and equipment now under contract approximate a total cost of $150,000,000.

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• **In order to** expedite shipment of vital emergency landing airfield mats to armed forces in the Pacific area, Irving Subway Grating Co., Long

How Industries Are Boosting Production And Assisting War

Island City, N. Y., has opened a west coast plant located in Oakland, Cal., according to Walter E. Irving, president and chairman of the board.

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• **An increased** wartime demand for Carpenter Steel Co., Reading, Pa., (tool, alloy and stainless steels) has led the company to move the St. Louis district warehouse to larger quarters at 712 Cass Ave. The new warehouse will be under the direction of District Manager K. L. Crickman and will be headquarters for district representatives, John A. Koch and William I. Potteiger.

•

• **A group of Army** combustion engineers recently completed an intensive course of special training which will enable them to make sure that camps and hotels in which troops are housed are efficiently heated. Sponsored by the Army, the school was operated by the Brown Instrument division of the Minneapolis-Honeywell Regulator Co.

•

• *A proposed American War Standard, "Straight Screw Threads for High Temperature Bolting" has been approved by the American Standards Association. The project was initiated at the request of the WPB last June. The standard applies to pressure vessels and to steel pipe flanges, fittings and valves.*

•

• **Toledo again** ranked first in the world in shipment of coal during 1942, setting a new high record of 23,592,836 tons passing through the port in the 12-month period. Shipments during 1941 through Toledo totaled 23,501,836 net tons. The record was made in the face of a decline of total coal shipments from Lake Erie ports.

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• **The secret weapon which the employees at the Schenectady plant of the American Locomotive Co. have been producing since last June and which was America's answer to Rommel's motorized legions in the African battle has now been made public. It is the M-7, a 105-mm. howitzer mounted on a tank chassis with an anti-aircraft gun offering protection against overhead attack.**

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• V. M. Drury, president of Canadian Car & Foundry Co., Ltd., Toronto, said in a statement concerning the

various phases of operation and production of his company that although shortages due to wartime requirements had cut down car business, the company was able to deliver during the past year, freight car equipment to the value of $4,000,000 of which $750,000 was for export. Aircraft contracts were continuously hampered by difficulties in obtaining essential materials, he said, but achievement by the company's plants on this type of work has been satisfactory.

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• *The Cincinnati Gear Co. has started production in its new plant located at Mariemont, just outside of Cincinnati. The company, which moved to Cincinnati in 1909 steadily has increased its operations, and the new plant provides a 50 per cent increase in the company's heretofore maximum production. T. W. Christensen is president.*

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• *Canada now produces more army rifles in one week than it turned out in all of 1941, officials of the Department of Munitions and Supply announced. Army rifles are being made by Small Arms, Ltd., a government-owned company, whose plant has been enlarged six times the original capacity.*

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• **The remarkable growth** of Koebel Diamond Tool Co., Detroit, has caused the organization to move to larger quarters at 9456 Grinnell Ave. The company is a manufacturer of a wide variety of diamond dressing, boring and precision tools.

•

• *Extension of Canada's wartime conservation measures to ammunition packing is resulting in an annual saving of $4,500,000 and thousands of man-hours, and also is diverting large quantities of critical materials to more essential war uses. A number of modifications and substitutions have been carried out. The redesign of a cylinder for large anti-aircraft shells is saving $1,250,000 and $3,750,000 man-hours annually. Wherever possible, the use of soldered tinplate has been converted to fibre, terneplate and enamelled black iron.*

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• **Most of the** large steel fabricators, and many of the smaller ones, are receiving orders at an accelerated rate for ship fabrication jobs, work that was formerly carried out at the shipyards. Orders are for such subassembly jobs as hatch covers and king posts, which are now in some instances being made by eastern plants even for West Coast yards.

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• **In further recognition** of the growing contribution of maintenance to the war effort, Allis-Chalmers Mfg.

Co., Milwaukee, has released another maintenance manual, "Handbook for Wartime Care of Centrifugal Pumps." It is part of a series which already includes books on the care of motors and V-belts.

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• *For the first time, the American Society for Testing Materials has compiled in one compact volume all of its specifications covering steel piping materials. Copies of the 256-page book can be obtained from A.S.T.M. Headquarters, 260 S. Broad St., Philadelphia, at $1.75 per copy.*

•

• **The J. McMeekan Co.** of Southern Rhodesia, Africa, is now a manufacturer of Meehanite castings, according to the Meehanite Metal Corp., Pittsburgh. It is the ninth firm to go into the production of Meehanite castings in South Africa.

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• **The addition** of a metal washing division for designing and manufacturing washing machines for industrial purposes was recently announced

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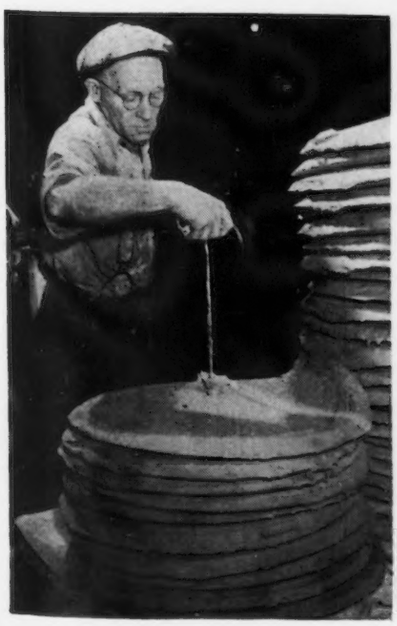
FROM "SOUP-TO-NUTS" IN INDUSTRY: A stack of wet clay pancakes is the diet of a horizontal mill of the Westinghouse porcelain plant at Derry, Pa. A pug mill operator is shown dipping his fork into the "stack of wheats" for feeding into the mill. This is one of the early operations by which a pug, a concoction of feldspar, clay and flint is fashioned from a pancake to obtain fine interior consistency and then becomes a giant porcelain bushing tube, insulator or bus support, for power lines.

World Wide Photos



by the American Foundry Equipment Co., of Mishawaka, Indiana. Batch type machines are available as well as large continuous conveyor and monorail-spray types. The machines will be suitable for solvent-emulsion degreasing or alkali cleaning.

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• **Westinghouse Electric & Mfg. Co. received orders for well over a billion dollars worth of war-needed equipment in 1942, according to a report of A. W. Robertson, chairman. It was the first billion dollar year in the history of the company.**

•

• **The Ford Motor Co.** has received two new Army Ordnance contracts, one for tanks and the other for gun mounts, totaling more than $100,000,000. The tanks are to be manufactured in a Ford plant in the Detroit area. The gun mounts will be shipped to Chicago plants for assembly, it is understood.

•

• **The American Propeller Corp.,** Toledo, will become the largest hollow steel propeller blade manufacturing plant in the country after increasing present plant capacity 50 per cent by purchase of additional machinery and equipment. William F. Wise, president, said shipments are now two months ahead of contract schedules.

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• *Canada's external trade for 1942 exceeded $4,000,000,000, which compares with $1,687,000,000 in 1939, Trade Minister MacKinnon stated in a year-end review of the trade situation. It is officially estimated that in 1942 Canadian war industry had produced goods to the value of $2,600,000,000 compared with $1,200,000,000 in 1941.*

•

• *New contracts have expanded the work of Fisher Body Division of General Motors on the production of gun breech housing mechanisms for the Navy "to mammoth proportions." Nearly $4,000,000 worth of new machines and equipment will be required, in addition to arrangements for extensive sub-contracting. Monthly output of the gun parts will be at the highest rate ever undertaken by one company, it was said.*

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• *"Flying jeeps"—two-man Piper Cub planes—are now being used for artillery spotting in North Africa, their first test under fire. This air cavalry is made up of small, low power airplanes flown at tree top height.*

•

• *The Todd-Bath Iron Works Shipbuilding Corp., and the South Portland Shipbuilding Corp., have been*

Acme

SHAPING SHELLS FOR ACK-ACKS: Lillian Hill (front) and Dolores Jenifer work a machine that shapes shells for anti-aircraft guns in the Washington Navy Yard. They are two of the 1400 women now being employed by the Navy in the vast yard that lies on the outskirts of the nation's capitol. No discrimination here.

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merged under the name of the latter. The Todd-Bath end of the business is to be known as the East Yard and the South Portland as the West Yard.

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• The J. B. Ford Co. and Michigan Alkali Co., its affiliate, have consolidated as one company to be known as Wyandotte Chemicals Corp. The consolidation combines in one organization one of the largest producers and distributors of chemicals and the world's largest manufacturer of specialized cleaning materials. E. M. Ford, formerly a director of The J. B. Ford Co., is president of the new corporation. In his announcement he said the consolidation will entail no change in ownership nor will any new personnel be included in management.

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• Selected 18-year-old seniors at Buffalo's McKinley Vocational High School are attending classes half a day and working in war plants half a trick. The school requested students be permitted to work at jobs which "complement their vocational education in machine shop practice, sheet metal and patternmaking" and their assignments be rotated to broaden their shop knowledge.

Milestones

• • • **The American Optical Co.,** Southbridge, Mass., celebrated Jan. 18 its 110th anniversary of continuous service in the cause of better vision by announcing the greatest lens production of its history during 1942.

Established in 1833 as a one-man concern, the company now employs more than 12,000 men and women, and possesses three additional factories in the United States, two in Canada, and one in England—all actively engaged in war work. More than 70 per cent of its entire production is going directly and indirectly into the war effort.

Completion of a large lens-grinding plant at Brattleboro, Vt., was also announced by General Manager Ira Mosher who stated: "The American Optical Co. now has four lens-grinding units. Censorship forbids revealing their annual output, but it can be said that their total production would make very depressing news for the Axis."

DIVER'S AIR HOSE OF SYNTHETIC RUBBER: G. L. Matthias, general superintendent of the Industrial Products Div., The B. F. Goodrich Co., examines a diver's air hose made with synthetic rubber manufactured in one of the new government-owned man-made rubber plants "somewhere in the U. S. A."

Swing to Non-ferrous By Steel Stampers Seen Reflected at War's End

Toledo

• • • **The stamping industry** for which Toledo has long been prominent gradually is undergoing a change, due mainly to the type of war goods contracts received. Instead of making exclusively steel stampings for the automotive industry, during the past year all but three firms have added nonferrous stampings to their line.

The significance of the change from steel to aluminum, copper, brass, magnesium, and other nonferrous stamped sheet products at first glance seems negligible, but further consideration reveals other implications. To get into the nonferrous stamping business, practically all of these plants acquired new machinery, new production techniques and perhaps broadened ideas of manufacturing possibilities. In post-war markets to utilize these new acquirements, the market possibilities and scope of products from these plants will have to be broadened. Perhaps the stamping companies will find it not practical to rely upon the automotive industry as their sole customer and will branch into other consuming fields where their extended lines of manufacture can be utilized.

Or, perhaps changes in the post-war auto industry will be such that the new capacity of the stampers can be utilized.

Small Orders Rule Clarified

• • • **Clarification** of the WPB description of "small orders" under CMP Regulation No. 1 has been issued. The paragraph should read:

Small order means a delivery order for Class A product placed with the manufacturer thereof by a consumer, where the aggregate amounts of controlled material required to fill such order, together with *all delivery orders for the same Class A product* placed by the same consumer with the same manufacturer calling for delivery during the same month, do not exceed the following:

Carbon steel (including wrought iron)	1 ton
Alloy steel	400 lb.
Copper and copper base alloys	100 lb.
Aluminum	20 lb.

CANADA — Plants of the Dominion Expected to Reach Highest Production in History During 1943

● *About 65 per cent of Canada's iron and steel output was cut off last week in strikes at Algoma Steel Corp., Ltd., and Dominion Steel & Coal Corp., Ltd. A total of 13,500 men were out and sympathy strikes were also planned. The strike followed a commisssion report that basic rates remain unchanged except for maintenance men. War plant owners did not appear unduly alarmed over a shortage of steel for the next two or three weeks.*

• • • **For Canada** the year 1942 was one of the most important in its industrial and economic history. Many new plants and additions were brought into production, and a number of new lines of manufacture were started.

In iron, steel, copper, nickel, aluminum, zinc, lead and numerous other strategic metals all previous production records were shattered by a wide margin.

During 1942 the governments of Canada and Great Britain invested $200,000,000 in Canadian plants for the production of war materials, which brings the total investment on this account since the end of 1939 to almost $800,000,000. To this sum should be added another $300,000,000 for plant expansions by private companies on their own behalf. As a result of plant expansion in 1942 it is estimated that this country will be in a position to add about $2,000,000,000 to industrial output during 1943.

Contracts awarded and commitments made by the Department of Munitions and Supply and its predecessors from the middle of July to the end of 1942, on Canadian, United Kingdom and other account, exceed $6,000,000,000.

To date the actual value of war products delivered against contracts placed through government sources, total almost $3,000,000,000, leaving a like amount still to be filled on the books of the various contracting companies, and the greater part of this latter figure is planned for delivery during 1943. In addition to the above total Canada's direct war expenditure for 1943 will total approximately $3,700,000,000.

During 1942 production on war account more than doubled that of the year immediately preceding, while for the year ahead it is estimated that output of many articles will double that of the past year. Following is a comparative table dealing with production of the more important war materials:

(Dollars—000 Omitted)

	1942	1941
Mechanical transport	404,000	206,000
Miscellaneous military equip.	390,000	190,000
Cargo & naval vessels	274,000	105,000
Aircraft	235,000	102,000
Ammunition	227,000	95,000
Guns & small arms	186,000	22,000
Armored & fighting vehicles	160,000	22,000
Chemicals & explosives	121,000	50,000
Instruments, tools, etc.	81,000	13,000
Small arms ammunition	41,000	16,000

While Canada made an impressive record in production last year, the completion of many new plants and additions during 1942 places this country in a position where maximum production will be reached early in 1943. However, according to government officials, output of Canadian plants in the future will be on a somewhat more selective basis. Merchant ship building, which totalled about 1,000,000 tons in 1942, chiefly in the 10,000-ton deadweight ship class, will be increased by 500,000 tons this year.

At the beginning of 1940 there were 10 blast furnaces in Canada with total rated capacity of 1,514,626 tons per year. In 1941 the Steel Co. of Canada, Ltd., Hamilton, completed installation of a new furnace bringing the total pig iron capacity at the close of that year to 2,069,560 tons, and in 1942 Canadian Furnace Co., at Port Colborne completed and blew in a small stack, which brought the rated Canadian iron capacity at the end of 1942 to 2,123,320 tons a year. Both the Dominion Steel & Coal Corp., Ltd., Sydney, N. S., and Algoma Steel Corp., Ltd., Sault Ste. Marie, Ont., are proceeding with installation of 1000-ton blast furnaces, but owing to delay in getting delivery of equipment from the United States, these stacks were not completed on schedule in 1942, but are expected to be ready to blow in during the first quarter of 1943, and will bring Canada's total pig iron capacity to about 2,625,000 tons in 1943.

Canada's steel production capacity also was substantially enlarged during the year, with special attention given to alloy steel production, which has been increased more than six times since the outbreak of war. In 1942, 98,000 tons were added to basic open hearth capacity and 70,000 tons to electric capacity, which brought the rated capacity for ingots at the close of the year to 3,151,000 net tons. Rated capacity for production of steel castings was increased in 1942 by 58,000 tons to a total of 258,000 tons. Further large expansion is in process for 1943. The Steel Co. of Canada, Ltd., is installing a new 60-ton electric furnace, which will be completed soon. The company also is installing a Bessemer furnace. Algoma Steel Corp., Ltd., Sault Ste. Marie, is installing a Bessemer converter with annual capacity of about 250,000 tons yearly. On the completion of the above undertakings 500,000 tons will be added to Canada's annual steel production capacity. Dominion Foundries & Steel, Ltd., Hamilton, and Atlas Steels, Ltd., Welland, Ont., also are proceeding with new steel making facilities, and will boost output of alloy steels in the coming year.

During 1942 Canada passed all previous records in the production of iron and steel. Pig iron output last year topped the previous high made in 1941 by about 30 per cent; steel ingots rose to a new all time high 14 per cent above the previous year while steel castings jumped 45 per cent above the high record made in 1941.

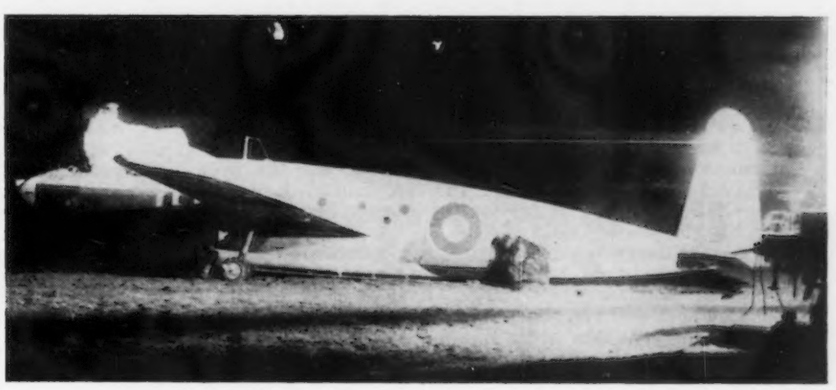
How Canadian Production Has Risen

Year	Gross Tons			
	Pig Iron	*Steel Ingots*	*Steel Castings*	*Ferroalloys*
1923	880,018	839,710	45,060	29,951
1925	570,397	783,855	18,840	25,709
1929	1,090,244	1,309,543	70,145	80,010
1930	747,178	957,430	54,313	65,223
1932	144,130	312,360	22,915	16,161
1933	227,315	294,059	15,920	30,123
1937	898,855	1,336,228	66,654	82 072
1938	705,099	1,105,427	50,568	53,322
1939	755,731	1,130,408	54,462	76,367
1940	1,168,894	1,944,619	69,553	135,412
1941	1,364,334	2,301,842	110,045	190,374
1942	1,777,000	2,634,000	160,000	196,000

Acme

LARGEST, FASTEST TRANSPORT: Capable of carrying men and large quantities of equipment over long range, the Lockheed "Constellation" is reputed to be the largest, fastest and most powerful land-based transport plane in flight. The mighty ship is shown prior to her initial flight from the Lockheed Air Terminal in Burbank. Its four 2,000-horsepower Wright engines are mounted in an airframe of new aerodynamic efficiency. At cruising speed, at about half power, the Constellation is approximately 100 miles an hour faster than standard air-cargo or airline ships of today. The Constellation is able to cruise through thin air at 20,000 feet and yet maintain air density of an 8,000-ft. level in the pressurized cabin. In case of need, the Constellation can rise comfortably to 35,000 ft.

PUNCHING HITLER: Adolph gets punched daily by the employees of the N. A. Woodworth Co., Ferndale, Michigan. The novel idea of putting Hitler's picture on all time clocks was suggested by an employee and adopted by the company.



World Wide Photos

TRAIN BY NIGHT: This glider's clean lines are sharply emphasized in the brilliant floodlight at a Royal Air Force station where glider pilots are receiving night training.

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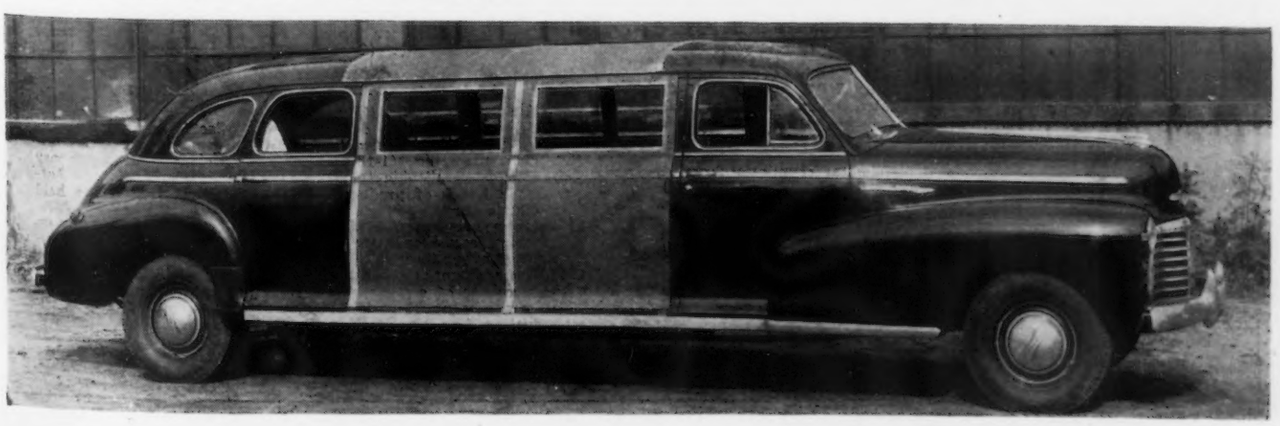
PRESTO CHANGE-O: Fitzjohn Coach Co., is converting four-door model cars into 16 passenger buses by splitting the passenger car into two sections and inserting a 6-ft. center portion. The inserted body section is made of white ash with exterior panels of composition material.



Smooth Changeover Promised by Details of PRP to CMP Transition

Cleveland

• • • **G. G. Yule,** local assistant regional priorities manager, indicated recently that plans for the transitional period between PRP and CMP have been worked out in all details and it was stated that the changeover would be much smoother than when the priorities system was changed over to PRP.

Another phase of CMP, that covering maintenance, repair, and operation materials, will be covered by an order called the MRO Regulation which will be issued shortly. This regulation will clear up foggy interpretations that existed under PRP and will define clearly what is included under repair, maintenance, and operation supplies. Manufacturers will get operating supplies on the certification that such supplies will be used in accordance with the regulation, and such orders must be marked (MRO). These orders will have the same status as orders bearing allotment numbers under CMP Reg. No. 1. MRO will apply only to controlled materials, a restriction that may be confusing if such supplies contain materials that are on the controlled list and other materials. It is believed that Form PD-1-A will be used by small manufacturers to get operating supplies.

Manufacturers will be grouped into two classifications. Group I will include those manufacturers in essential war industries and such operating supply orders as will come from this group will carry AA-1 ratings. The Group II manufacturers will be those in essential civilian industries, whose orders will carry ratings in the

This Week's Priorities and Prices

Concrete bar production will be concentrated in rerolling mills in order to conserve skilled manpower. (WPB-2349)

A blanket preference rating of AA-3 has been assigned to deliveries of materials for use in the construction of most of the war housing projects programmed by the National Housing Agency. (WPB-2339)

Hard-facing material producers are required to file reports on December shipments and February requirements by Jan. 15, the Steel Division has announced. (T-1568)

Aluminum users will not be required to file the inventory report on form PD-40A inasmuch as a CMP inventory report for the quarter ending Dec. 31 will be required. (T-1582)

Farm machinery manufacturers may establish temporary maximum prices for equipment which has been modified since March 31, 1942, provided the new prices have the approval of the OPA, under Amendment No. 3 to Maximum Price Regulation 246.

Scrap iron and steel price adjustments, designed to encourage preparation of scrap for furnace use prior to shipment to consuming mills, are given in Amendment No. 10 to Revised Price Schedule No. 4. (OPA-1479)

Magnesium scrap and remelt magnesium ingot maximum prices have been established in Maximum Price Regulation No. 302, effective Jan. 20. (OPA-T-504)

The Chrysler Corp. has been permitted to raise ceiling prices on 20 models of their marine engines sold to the Navy and other government agencies under Order No. 4 under Maximum Price Regulation No. 136. (OPA-1483)

A down-grading chart which will guide engineers and designers in specifying lower grades of critical material for brass and bronze castings has been issued by the Specifications Branch of the WPB Conservation Division. (T-1592)

Scrap dealers and automobile graveyards in Canada are aided in obtaining necessary repair and maintenance materials by an amendment to Order P-136. (T-1598)

Scrap lead price regulations were simplified and made more definite in an amendment to MPR 70 by OPA Jan. 15. (OPA-T-503)

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For copies of above announcements address Office of War Information, Washington, giving announcement number as shown in parentheses after each paragraph. (For example, WPB-600 *means announcement* 600 *issued by the War Production Board.)*

Revisions to The Iron Age Priorities Guide

• • • The following data, together with all intermediate weekly revisions in THE IRON AGE, should be added to THE IRON AGE Priorities Guide published with the issue of October 8 to bring the Guide up to date.

"M" Orders:

M-15-g...Supplementary order places sale and delivery of new tires for industrial power trucks under WPB control (1-15-43).

M-29...Amended order removes tungsten chemicals from order (1-9-43).

M-81...Amended order (1-13-42) increases amount of canned soups and other foods to be packed in 1943.

M-110...Amended order removes molybdenum chemicals from order (1-9-43).

M-161...Amendment (1-15-43) places certain non-metallic minerals under inventory restrictions.

M-200...Amended order permits increase in production of metal milk cans (1-15-43).

"P" Orders:

P-46-c...Order permits short extensions of existing rural power lines to operate specified farm production equipment (1-14-43).

P-88...Interpretation No. 1 (1-15-43) permits repair of leased equipment without authorization required heretofore.

P-136...Amendment (1-15-43) gives aid to Canadian scrap dealers in obtaining necessary repair and maintenance material.

"E" Orders: (Correction)

E-1-b...Amended order nullifies the effect of the preference rating for Service purchaser orders which do not carry urgency standings (12-29-42). (Correction to this column, Jan. 7.)

"L" Orders:

L-30-a...Amended order freezes manufacturers' inventories of pails, buckets and wash tubs (1-15-43).

L-54-c...A more specific definition of "offset" duplicating machines has been inserted (1-15-43).

L-180...Interpretation (1-12-43) makes it clear that inventory restrictions applicable to replacement and rebuilt storage batteries in hands of producers are distinguished from those held by distributors.

L-215...Interpretation (1-11-43) makes it clear that limitations on the order apply only to parts produced or purchased for improving, expanding, or adding to machinery.

L-221...Amendment (1-15-43) requires rating of AA-5 or higher for purchase of electric motors and generators.

L-222...Amendment (1-15-43) postpones floor finishing machinery production ban.

L-236...Amendment postpones effective date of Schedule 1 to March 1, 1943 (1-13-43).

Important Announcement!

Effective January 1, 1943, the name of Scully Steel Products Company was changed to United States Steel Supply Company

Scully... for many years a member of the family of United States Steel Subsidiaries — now takes a name which more fully represents its ability to serve you with a comprehensive list of steels and steel products.

Only the name has been changed. The same personnel in our eight conveniently located warehouses will continue to do their best to take care of your needs.

The prompt and courteous service that has made the name "Scully" famous will be maintained.

The addresses and phone numbers of our warehouses remain the same.

As always, we stand ready to give our customers every help we can in getting the right steel as promptly as possible.

UNITED STATES STEEL SUPPLY COMPANY

Distributors of Steel and Steel Products

CHICAGO
BRunswick 2000
Teletype CG. 605

BOSTON
STAdium 9400
Teletype BRTN 10

CLEVELAND
HEnderson 5750
Teletype CV 153

ST. PAUL-MINNEAPOLIS
NEstor 2821
Teletype STP 154

PITTSBURGH
CEdar 7780
Teletype PG 475

BALTIMORE
GILmore 3100

ST. LOUIS
MAin 5235

NEWARK, N. J.
BIgelow 3-5920—BErgen 3-1614—REctor 2-6560
Teletype NK 74

USS

UNITED STATES STEEL

AA-2 classifications, either AA-2 or AA-2-X.

•

New Tin Orders

• • • **Manufacture** of simplified type milk cans in the 12 months ending June 30, 1943, may be increased by about 75 per cent under Conservation Order M-200 as amended by WPB.

A manufacturer, during the 12 months ending June 30, 1943, may use 65 per cent of the weight of iron and steel which he used in the production of old type milk cans in the 12 months ending June 30, 1942. He may add to that total the difference between the amount of iron and steel he has used in old type milk cans since July 1, and the amount he would have used if all the cans he manufactured had been of the new simplified type.

• • • **WPB last Friday** loosened the restrictions on the manufacture of cans limited by Order L-30-a. One to five gallon cans designed for storage of oil, gasoline or kerosene may be produced for the fulfillment of preferred and certain other orders.

•

Eight Projects Stopped

• • • **Preference Rating** orders for eight U. S. Department of Agriculture projects were revoked Jan. 13 by WPB. Construction on those projects now being built was ordered stopped.

•

Floor Finishing Machines

• • • **Postponement** of the curtailment dates on production and assembly of parts for floor finishing and maintenance machines and industrial vacuum cleaners has been authorized by the WPB in amending Order L-222.

•

Canadian Scrappers Aided

• • • **Scrap dealers** and automobile graveyards in Canada are aided in obtaining necessary repair and maintenance material by an amendment to Order P-136. Prior to the issuance of this amendment, Canadian dealers were not included under the preference rating.

•

PD-40A Rulings

• • • **Because a CMP** inventory report for the quarter ended Dec. 31, 1942, will be required of aluminum users, the inventory report on form PD-40A will not be required for the quarter in question, the Aluminum and Magnesium Division has announced. The quarterly PD-40A form normally would be submitted by Jan. 20 under the terms of Order M-1-i. The Division cautioned that the monthly report on the special PD-40A for aircraft must be filed as usual.

•

PR No. 13 Clarified

• • • **In an official** interpretation of Regulation No. 13, announced Jan. 13 by WPB, it is pointed out that certain recent orders affecting specific industries refer to paragraph (c) (3) of the regulation and provide in their texts that special sales of materials may be made to others in the same busi-

ness as the seller. The interpretation goes on to say that this reference to paragraph (c) does not remove the materials affected from other provisions of Regulation No. 13, including reporting requirements of any redistribution program, and that all special sales allowable under the regulation may be made. Regulation No. 13 provides for special sales of restricted materials to expedite their use in war production.

•

L-236 Extended

• • • **The effective date** of Schedule 1 of Limitation Order L-236 covering the manufacture of builders finishing hardware was advanced from Jan. 15 to March 1, 1943, in an amendment of the order issued Jan. 13 by WPB. Some changes in the order are expected before the new effective date.

•

P-88 Interpreted

• • • **WPB last Friday** interpreted Order P-88 by defining "railroad's own equipment" as used in subparagraph (f) (1) of Order P-88 to include equipment regularly leased by the railroad and used by it in its operations. The effect of the definition is to enable railroads to repair leased equipment regularly in operation without the necessity of securing specific authorization from WPB.

•

AA-5 on Motors, Generators

• • • **Purchase orders** for electric motors and generators shall not be accepted by manufacturers or dealers unless they bear preference ratings of AA-5 or higher under the terms of Conservation Order L-221 as amended last Friday by the WPB.

•

Price-Fixing and Rationing Won't Change Under Brown

Washington

• • • **Politically** the administration of Prentiss Brown as head of OPA promises to differ considerably from that of his predecessor, Leon Henderson. Otherwise the price-fixing and rationing pattern fixed by Henderson is expected to undergo but little change. Nor does there seem to be any likelihood of any important turnover in the OPA's staff of aides. Their resignations are looked upon merely as a formal gesture giving the new boss a chance to select his own board of strategists. The resignations, with possibly an exception here and there, likely will be rejected.

Traditional of all government bureaus OPA may be expected to swell rather than shrink, unless the new Congress really means it when it says it is going to wield the ax. The late Gen. Hugh S. Johnson spoke with precision, based on experience, when he said something to the effect that nothing on this earth is so immortal as a government bureau.

With price and ration machinery probably left unchanged, the change in the OPA setup is to be a smoother political operation. Henderson was brusque in dealing with Congress and to that extent was an amateur administrator. Brown will play along sweetly with his former cronies who think well of him.

Maximum Scrap Prices Altered To Encourage Processing Fields

Washington

• • • **OPA on Jan. 16** made one of the first contributions toward the welfare of the scrap iron and steel trade by altering the maximum prices through Amendment No. 10 to Schedule 4 which will encourage the preparation of scrap before shipment to consumers through a lowering of the price on unprepared scrap, thus widening the margin. This change becomes effective Jan. 22, 1943.

On machine shop turnings and mixed borings and turnings the reduction is $1 per gross ton. The differential between unprepared scrap sold to consuming mills and prepared heavy melting steel has been increased to $3.50 from $2.50. Cut structural and plate scrap, one, two and three ft. in length each, are increased 50c. The differential between clean auto cast and unstripped motor blocks is increased from 50c to $2.50 per gross ton. The regulation also is amended to include the definition of broker and thereby allows a brokerage commission to one who prepares scrap in transit when such service is performed by the person selling the scrap to the consumer.

Turnings and Borings: Prices of machine shop turnings and mixed borings and turnings are reduced $1 per gross ton, and the price of shoveling turnings is raised $1 per gross ton. At the same time, charges for crushing machine shop turnings and shoveling turnings have been eliminated. The new amendment thus permits ordinary machine shop turnings to be converted into short turnings by crushing, raking, or other processes and command a premium of $2 per gross ton.

In addition to changes in prices and specifications for these turnings, the specifications for baled machine shop turnings have been amended to permit the inclusion of not over 25 per cent "by weight" of black sheet scrap used for binding or wrapping purposes.

The "preparation - in - transit" privilege previously established for certain unprepared scrap in rail carload lots allocated by the War Production Board has been extended to baled machine shop turnings prepared in transit from machine shop turnings allocated in rail carload lots by WPB. On turnings thus bundled under WPB allocation, consumers are allowed to route the turnings to the yard of a dealer and absorb the freight charges incurred in that movement, as well as the preparation fee specified.

Adjustments in Differentials: The provisions governing the price of unprepared scrap sold to consuming mills has been amended to increase to $3.50 from $2.50 the differential between unprepared and prepared heavy melting steel. No change, however, has been made in the $4 per gross ton differential previously established between No. 1, No. 2 and No. 3 bundles, and the unprepared material from which such bundles are made. This reduces the price that a consuming mill may pay for unprepared heavy melting steel, and, thereby promotes the continued flow of unprepared scrap to dealers' yards for preparation.

Revised Price Schedule No. 4 does not fix the maximum price at which a dealer may purchase unprepared steel scrap. While the $2.50 per gross ton spread between prepared and unprepared prices was adequate in the past, increases in cost of preparation made inroads upon the profitableness of preparing steel scrap. For these reasons, and after recommendations by the Iron and Steel Scrap Industry Advisory Committee, the differential now is changed to $3.50 per gross ton from $2.50.

Electric Furnace Grades: To preserve the continued production of certain short-cut electric furnace grades, the prices for such grades are revised upward. Cut structural and plate scrap, one, two and three ft. in length each, are increased 50c. per gross ton. Cut automotive steel scrap, now designated as Foundry Steel, has been revised in specifications, and prices increased $1 a gross ton. However, the 3-ft. grade has been eliminated. Foundry steel, 3 ft. and under in length, is described

AUTO ENGINEERS AT DETROIT: The war engineering production meeting of the Society of Automotive Engineers opened in the Motor City to elect a new president and discuss war production. Holding a magnesium casting that is one-fourth the weight of the old iron castings are (left to right) Mac Short, newly-elected president of SAE and president of the Vega Aircraft Corp.; Stephen G. Henry, Commandant of Armored Force at Fort Knox, and Arch Colwell, vice president of Thompson Products and past president of the society. *Acme*

as "steel scrap ⅛ in. and over in thickness, not over 2 ft. in length or 18 in. in width."

Clean Auto Cast: The differential, or spread, between clean auto cast and unstripped motor blocks is increased from 50c. per gross ton to $2.50 per gross ton. This has been accomplished by reducing the maximum price of unstripped motor blocks by $2 per gross ton.

No. 1 Bundles: The grade specifications of No. 1 bundles have been amended to permit the inclusion of Stanley ball, mandrel wound bundles and skelton reels, tightly secured. Similar classification has been given new hand-bundled sheet scrap which weighs 75 lb. per cu. ft., is tightly secured, and can stand handling with a magnet.

No. 2 Bundles: The specifications for No. 2 busheling have been amended to allow oil field and similar cable cut to lengths of 2 ft. or less to be included in this grade.

Other Changes: No. 1 machinery cast has been eliminated as a listed grade, but the specifications for No. 1 cupola cast have been altered to permit the inclusion of material normally sold as machinery cast.

The description of clean auto cast no longer contains a requirement that the blocks be broken into pieces 75 lb. and under.

Unstripped motor blocks have been more strictly defined and expressly exclude transmissions, parts of frames, drive shafts and differentials.

Charging box cast may now include unbroken cast iron car wheels.

Brokerage Commissions: The provisions of the schedule governing brokerage commissions have been amended to establish an exception to that part of the section which states that no commission shall be payable to a person for scrap which he prepares. The exception is that if scrap is sold to a consumer and prepared in transit under the terms of the preparation-in-transit privilege governing certain grades of steel scrap, the fact that the preparation is to be performed by the person selling the scrap to the consumer shall not prohibit him from charging a commission.

•

Price Ruling on Pipe

Washington

• • • **Jobbers, dealers** and distributers of iron and steel pipe in 12 western states were reminded by OPA on Monday that as provided in Revised Price Schedule No. 49—Resale of Iron and Steel Products—the freight from mill basing point to buyer's location is included in maximum prices for these products, and under the formula for determining prices is subject to a percentage mark-up.

At the same time the schedule provides that for specified pipe shipped from jobbers' stocks any freight actually paid in excess of 30c. per 100 lb. to equalize freight from the mill basing point to the buyer's location may be added to the price of the product. The charge for this freight in excess of 30c. per 100 lb., OPA warned, should not be marked-up but should be added to the price separately.

•

Farm Machinery

• • • **Temporary Maximum Prices** may be established by manufacturers for farm equipment which has been modified since March 31, 1942, provided the new prices have the approval of OPA and the manufacturers' production experience does not warrant establishment of permanent ceilings. The new procedure was embodied Jan. 13 in Amendment No. 3 to MPR 246 effective Jan. 19.

•

Importer's Prices

• • • **An importer who** had no maximum price in March, 1942, under the GMP regulation for an imported commodity now being sold or one similar to it may sell the commodity to an intermediate distributor or to an industrial user at a price reflecting a fair allowance above his total landed costs, OPA announced.

These provisions were made clear in amendment No. 1 to supplementary regulation No. 12, effective January 20.

Small Business Seen Hit by Acute Manpower Shortage

• • • **Some small businesses,** at least in the field of civilian goods production, are headed for almost certain extinction due to labor shortages in some areas, according to a warning issued by WPB's Donald M. Nelson to the Senate Committee on Small Business. Extinction will come for some through the necessity for concentrating the production of civilian goods within certain selected plants thus forcing the remaining plants in that field out of business. Some of Nelson's proposals require legislation and the committee is said to have begun preparation of the bills.

Many vexing problems have accompanied this proposal including compensation of those companies which would be forced out of business, possible entanglement with the anti-trust laws, the taxation of those companies who were selected to remain in business and the writing-off of taxes from those companies which are forced out of business.

Complaint was registered by the committee, with regard to the manpower situation, concerning the geographical concentration of war industries which has contributed to the acuteness of the labor shortage in concentration areas. This complaint has been more or less justified by the recent statement by WMC that the manpower shortage was of a local nature and not, as yet, national. That an impending national crisis is approaching is seen in this warning combined with the fact that Nelson estimates war production alone will require from four to seven million more workers in 1943.

•

Weirton Union, Inc.

Weirton, W. Va.

• • • **Primarily to acquire** land and erect a combined labor temple and community building here, the Weirton Independent Union whose membership is limited to employees of the Weirton Steel Co., has been incorporated under the laws of the State of West Virginia, according to Larry S. Lafferty, president.

It was said the incorporation also will enable the union to establish a plan under which benefits can be paid to members. Furthermore officials said, "our union has everything to gain and nothing to lose by putting our organization on the same footing as business concerns, hospitals, colleges, and other responsible groups. We will be subject to the same kind of legal limitations but we also will be entitled to the same privileges and standing."

Freak Wage Case Sets WLB Precedents

• • • **What seems to be an all-time record for setting precedents by the WLB occured recently in a decision affecting only 20 employees of the American Smelting & Refining Co., Long Island City, N. Y.**

For the first time in WLB's history the public members were outvoted by the labor and industry members, a wage increase grossing 29.75 per cent was granted thereby breaking the 15 per cent yardstick resolution and the raise was granted admittedly as a measure to stop the movement of labor — a principle always before avoided.

•

Labor Situation Growing More Serious at Pittsburgh

Pittsburgh

• • • **Prejudices, if any,** against the hiring of women workers have now been swept away by the manpower situation which is growing more serious each week in this and nearby districts. However, companies which are now laying plans for the employment of women in jobs formerly held by men are finding that some industrialists had this idea some time ago and in many instances have taken the "cream of the crop."

Several months ago practically all steel companies, as reported in THE IRON AGE, had begun replacing male clerical help inside the mills with girls or women. Steps had also been taken toward hiring women for laboratory positions and certain metallurgical jobs. Furthermore, men employees who had been pensioned were being called back, and in most cases physical examinations had been relaxed to some extent on new employees.

Recently, women have filtered more and more into regular mill jobs. One company in the Youngstown district has put to work between 300 and 400 women workers on jobs formerly held by men. These positions include lighter crane operations, clerical help, laboratory technicians, recorders, and inspectors.

Another large steel company in the Pittsburgh district is rapidly taking on women as mill inspectors and recorders and soon plans to train and place women in various other mill jobs. While it is true that applications for work are still being placed by men in certain Pittsburgh locations, the number of such applications is falling off rapidly and in some nearby districts has disappeared entirely.

Probably the most serious drawback toward placing more women at work is the difficulty in obtaining and installing proper sanitary equipment required under the state law. It is expected before long that government help may be necessary in expediting the obtaining of material, such as toilets, lockers, etc.

According to opinions of some personnel men as expressed to THE IRON AGE, there is a possibility that before long the Pittsburgh district may become stabilized under the manpower commission. Difficulties are expected to be encountered filling many jobs at new plants which will soon be starting or expanding war production. The American Bridge Co. has had a large ad in Pittsburgh papers calling for 1000 men, while Carnegie-Illinois Steel Corp., which has already lost 25,285 men to the armed forces, has been advertising for skilled and unskilled workers for the past several weeks and has its interviewing office open seven days a week. Many other metal working plants in the Pittsburgh district are carrying large ads calling for skilled and unskilled workers.

One factor in the present picture is the extreme scarcity of ordinary laborers. Practically no applications are being placed for this type of work and the majority

of steel mills are running short of common labor. In practically every instance these jobs cannot be filled by women owing to the nature of the work.

Carnegie-Illinois Steel Corp. recently has placed a woman personnel officer in charge of interviewing and training all girls applying at the city office for jobs formerly held by men. It is also understood that a similar plan is under way for the plant employment offices. While women personnel officers have always interviewed girls or women for so-called white collar jobs, this latest step on plant workers has apparently been taken to insure a more complete preliminary interview.

As far as can be learned here, there is no discrimination on the part of management in the employment of negro workers who always have constituted a representative proportion of the steel mill personnel.

Personnel managers say that within the next few months they may have to further relax physical requirements for new workers. This move will probably be brought about by the tremendous drain on young workers as they are inducted into the Army. The rejection of men 38 years and older has only served to concentrate the armed force demand upon those ranging from 18 to 37.

•

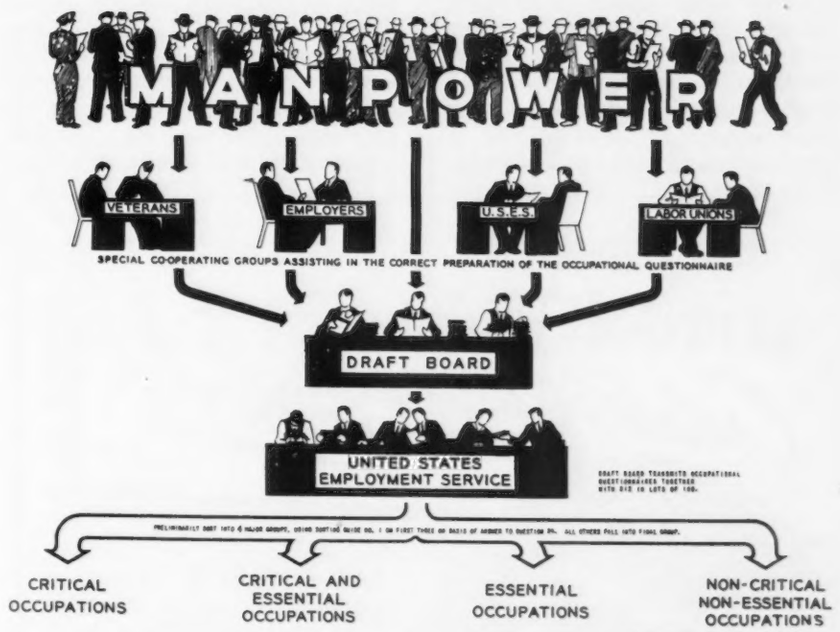
WLB Extends Wage Increase in U. S. Steel

Washington

• • • **WLB extended** a wage increase of 5½c., retroactive in most applications to Feb. 15 last, with union maintenance and check-off to six subsidiaries of United States Steel Corp. in an order issued Jan. 14 over the dissention of the employer members of the panel. The retroactive pay feature was excluded from two of the subsidiaries.

The dissenting opinion of the employer members, Roger D. Lapham and Frederick S. Fales, said in part (the panel report) "definitely recognizes that these six companies are not part of the basic steel industry. Actually, there can be no basis on which this board can direct that contracts be nullified and wages paid retroactively to Feb. 15, 1942."

HOW TO PROCESS OCCUPATIONAL QUESTIONNAIRES



Courtesy Penna. USES

WHAT HAPPENED TO YOUR OCCUPATIONAL QUESTIONNAIRE: This chart shows where your questionnaire went after you mailed it. What you probably didn't know is that it was classified into these four major groups, shown at the bottom of the chart, according to your qualifications. After this classification, those termed critical are broken into war-producers and non-war-producers. Records of those actually working in AAA-AA3 war industries are filed in the active OQ (occupational questionnaire) file only. If in less important essential work (down to AA-10) you may be asked to fill out a USES employment application which will place your records in the active war-employment file and the closed OQ file. If later you refuse to accept war work your records go into the employee reserve and the dead OQ file. Naturally, if your record shows critical skills your name will be prominent in the active employment file. If your skills are suitable only to "essential" industry having little or no priority ratings your questionnaire merely goes into the active OQ file for action later. The same course is followed with non-essential skill records.

The companies were the American Bridge Co., Virginia Bridge Co., Oil Well Supply Co., Universal Atlas Cement Co., Boyle Mfg. Co. and Scully Steel Products Co.

•

WPB Regions Get Labor Representatives

Washington

• • • **WPB placed** representatives of the Labor Division as staff aides to the regional directors with authority to deal directly with war production questions affecting labor organizations within their respective regions.

The regional labor representative will represent WPB to the regional War Manpower Commission chairman and will consult with and advise him on problems affecting labor organizations.

Powder Metallurgy Book To Be Issued in February

• • • **A new book on** powder metallurgy, by Dr. Walter J. Baeza, teacher and consulting chemist, will be published in February by Reinhold Publishing Corp. The book called "A Course in Powder Metallurgy" consists of a section on the history of the technique and on laboratory and plant processes, a section on practical suggestions for assigning experiments to students, and a section outlining 15 experiments.

Equipment Distributors Hear Renegotiation Law Attacked

Chicago

• • • **Legislation** forcing renegotiation of war contracts is creating a smoke screen under which inefficiency, higher costs and slowed production can hide, A. G. Bryant, president of Bryant Machinery & Engineering Co., charged last week in an address before a meeting of the Associated Equipment Distributors at the Edgewater Beach Hotel.

All Americans, Mr. Bryant said, are insistent that exorbitant profits derived from war work be eliminated. The renegotiation law, passed to achieve this end, falls far short of its mark and instead is adding to costs and slowing down production, he said. Existing tax laws, which take at least 80 per cent of present profits, assure against excessive profits, Mr. Bryant pointed out, and at the same time low cost producers are not discouraged.

"Many wild theories have been put into effect by government," Mr. Bryant said, "but to our knowledge, this is the first time when a country, needing vital production and conservation of labor and goods, actually provides an incentive to a manufacturer to let his cost go high and his production lag so that his profits will be narrow and not subject to review."

Mr. Bryant paid high tribute to the men in charge of the various price renegotiation boards, but stressed that he felt that the whole idea of renegotiation is fundamentally wrong.

Renegotiation, as now constituted, undermines a company's financial security. All estimates of profits or possible earnings are worthless, in view of the fact that any time, perhaps months after a contract has been completed, the figures can be audited and a substantial part of net earnings seized by the government. A banker's problem in evaluating the credit standing of a manufacturer under these circumstances is obvious.

In answer to the assertion sometimes heard that increase in efficiency will result only in increased profits to industry, the machine tool executive pointed out that the usual result is an increase in taxes collected by the government, with possibly 10 to 20 per cent of the total saving remaining with the company.

In 1943, he predicted, industry will produce war goods in one of two ways. It will deliberately become inefficient to protect itself from attack by renegotiation. Or, it will economize, produce more, making some additional profits and contribute correspondingly more in Federal taxes.

Beauty Shop Opened In Plant for Women

Chicago

• • • Republic Drill & Tool Co. opened recently what is believed to be the first beauty shop in an industrial plant. It will operate from 9 a. m. to 11 p. m. for the convenience of women war workers who find the working hours at the plant conflict with beauty shop hours. Shop personnel of the Republic plant is almost 100 per cent women.

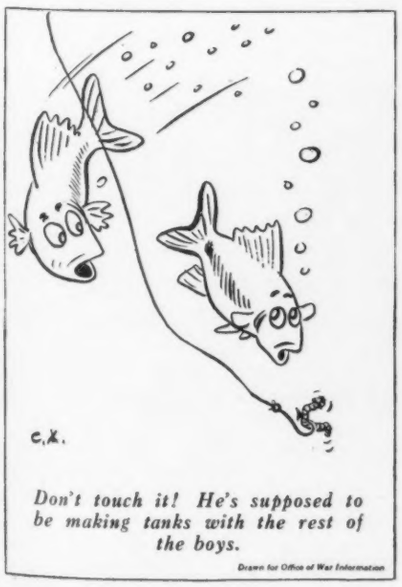
Francis Juraschek Head Of New Division for C-I

• • • **Francis Juraschek** has been named manager of the newly formed commercial research division, Carnegie-Illinois Steel Corp., Pittsburgh, effective Feb. 1. The present functions and personnel of the bureau of market research, the bureau of sales statistics and the sales statistician, all of the general sales department of Carnegie-Illinois, will be consolidated into a new commercial research division.

Mr. Juraschek has been manager of the bureau of market research for four years. Prior to that he was consulting editor of THE IRON AGE. Elmer E. Erickson, for many years manager of the bureau of sales statistics, has been named assistant manager of the commercial research division. Reuel L. Twitchell, formerly sales statistician, has been named sales analyst in the new commercial research division.

Export Licenses Are Halted for 7 Countries

• • • **BEW is notifying** American exporters that no new export license applications for shipments to seven South American countries, for which large backlogs of already licensed commodities have been built up beyond available shipping space, will be considered until March 1, 1943, except in cases of urgent necessity. The countries are: Argentina, Bolivia, Chile, Colombia, Ecuador, Peru and Venezuela.



Don't touch it! He's supposed to be making tanks with the rest of the boys.

Drawn for Office of War Information

Redistribution of Steel From Stocks Aids 192 Plants

New York

• • • **Redistribution** of 810,000 lb. of fabricated steel from the inventories of the International Business Machines Corp., Endicott, N. Y., to 192 war plants where it was urgently needed, was announced by the regional office of the WPB. It was moved into emergency war channels directly by the District Redistribution Div. of WPB.

Employees Scrap Award

Washington

• • • **A small black** and white emblem bearing the WPB seal and the words "Scrap Producer" will be given to employees in automobile graveyards and scrap dealers' yards by WPB for excellency in producing scrap. The emblems will be awarded to employees of wreckers and dealers who have received or will receive a scrap producer banner.

Calder Fills Position Vacated by Kanzler

Washington

• • • **The resignation** of Ernest Kanzler as WPB Director General for Operations, announced on Monday by WPB Chairman Donald M. Nelson was attributed to ill health. In acknowledging Mr. Kanzler's letter of resignation Mr. Nelson said:

"I have your letter of the 16th instant tendering your resignation as Director General for Operations of the War Production Board and I reluctantly accept it with the understanding that you will continue on my staff as an adviser.

"I have known that you have not been in good health recently and that you have been pushing yourself too hard. Realizing this, and knowing that you must get yourself back in shape, I am accepting your resignation as Director General. When you return, which I hope will be soon, I have an important assignment for you."

C. Calder, successor to Kanzler, is president of the American & Foreign Power Co. and his old job was former Assistant Deputy Director General for Industry Operations.

Otis Foundry Hit by Strike at Cleveland

Cleveland

• • • **Early this week** the Riverside Foundry of the Otis Steel Division of Jones & Laughlin Steel Corp. was crippled by an outlaw strike of USW members. Important war work was being held up.

The dispute arose over wage grievances affecting the entire plant which had been referred to an NLRB panel. Subsequent to the panel hearing, the union and the company agreed to negotiate the grievances on the basis of job evaluation. However, a few weeks ago about 80 men in the foundry collected their pay on pay day but refused to turn up for work. Early this week the outlaw strike spread and involved more than 100 men.

Leo Cassey, USW official, termed the walkout as a violation of the contract and the company refused to continue negotiations until the men returned to work. Meanwhile, the union changed its mind on settling the wage grievances by job evaluation and demanded that the wage rates be bargained. This would mean that the entire case would have to go back before the panel.

•

Buffalo

• • • **Operations** at the Bethlehem Steel Co. plant in Lackawanna continued without interruption this week despite a strike by 80 employees in the Electrical Maintenance Department. Edward F. Entwistle, general manager, declared the strike, which began last Saturday morning, was a "breach" of the labor contract the company has with the U. S. W. Julian K. Bruce, union officer, also branded the strike as "unauthorized." The strike resulted from a dispute over the terms for a "dangerous" job on an ore bridge.

Suspended Tanks Project Released for Blaw Knox Plant

Pittsburgh

• • • **Blaw Knox Co.** is to proceed with construction on the addition to its Union Steel Castings Division tank armor castings plant on which work was postponed last November, according to the company.

Canada Sets Record For Iron Ore Consumption

Toronto, Ont.

• • • **Consumption of iron ore** in Canada in 1942 was at the all time high record of 3,620,000 net tons, an increase of 34 per cent over the 2,700,000 tons used in blast furnaces in 1941 and compares with 2,356,000 tons in 1940 and 1,478,000 tons in 1939. Of the total iron ore used in Canada during the past year approximately 75 per cent was imported from the United States.

Steel Production to Exceed 96,000,000 Tons

Cincinnati

• • • **Expecting** steel production to exceed 96 million tons by July of this year, George S. Rose, secretary of the Iron & Steel Institute predicted to members of the Cincinnati Association of Purchasing Agents last week, that the United States would be producing 50 per cent more steel by that time than the Axis and Axis-dominated countries could produce under normal conditions. He said steel production by July would be about 70 per cent greater than any year during World War I.

DESIGN FOR SAFETY: Fred Dix, designer and painter of safety signs and cartoons used in connection with the United States Steel Supply Company's intensified safety program, puts the finishing touches on a new sign in his work shop at the company's Chicago plant.

Cadillac Tank Output Now Officially Disclosed

Detroit

• • • **A military secret** which was well known in Detroit, that Cadillac Motor Car Division has been in production on light tanks for some time, officially was disclosed when an Army-Navy E award was made to the company for excellence in its output of tank and aircraft engine parts.

Locomotives Controlled

Washington

• • • **Used Locomotives** have been placed under regulatory control by Order L-97, as amended. The order as originally issued controlled production and distribution of new locomotives. The purpose of the amendment is to establish control over the repair, sale, dismantling, scrapping or other disposition of surplus used or idle motive power.

12 More Contracts Get Defense Plant Corp.'s O.K.

Washington

• • • **Defense Plant Corp.,** RFC subsidiary, has authorized the following contracts:

Sealed Power Corp., Muskegon, Mich., to provide additional facilities for a plant in Michigan, making a total commitment of more than $2,000,000.

Cleveland Graphite Bronze Co., Cleveland, to provide plant facilities in Ohio at a cost in excess of $400,000.

Copper Alloy Foundry Co., Hillside, N. J., to provide additional equipment for a plant in New Jersey.

Frantz Distillers, Inc., Pittsburgh, to provide plant facilities in Pennsylvania.

Shawhan Distillery Co., Kansas City, Mo., to provide equipment in a plant in Kentucky.

General Motors Corp., Detroit, to provide for further expansion of a plant in Michigan at a cost in excess of $900,000, making an over-all commitment of more than $2,500,000.

Pacific Tube Co., Los Angeles, to provide plant facilities in California at a cost in excess of $1,500,000.

Krome Corp., Marshfield, Ore., to provide further expansion of a plant in Oregon at a cost in excess of $450,000.

American Central Mfg. Corp., Connersville, Ind., to provide plant facilities in Indiana at a cost in excess of $150,000.

Electromatic Typewriters, Inc., Rochester, N. Y., to provide equipment for a plant in New York at a cost in excess of $150,000.

Union Dental Instrument Mfg. Corp., Philadelphia, to provide equipment for a plant in Pennsylvania.

Broadfoot Iron Works, Wilmington, N. C., to provide equipment in a plant in North Carolina.

Low Grade Ore Project At Batesville, Ark., Halted

Washington

• • • **Suspension of** all activity relating to the attempt to utilize soft wad manganese ore reserves in the Batesville, Ark., district was announced recently by WPB. Investigation by a private company as agent for Metals Reserve Co. has shown that the reserves of manganese ore were not as large as anticipated and that the practicable production rate would be lower and operating costs higher than originally expected.

All-Time Record Set By Canadian Mines

Ottawa, Canada

• • • **Canada's mineral** production in 1942 reached the all-time record value of $564,200,000, Dominion Bureau of Statistics reported in its preliminary estimate for the year. The above total shows a gain of almost $4,000,000 over production for 1941 notwithstanding a drop of about $20,000,000 in gold production.

Three Sizes of Bars Given To Makers of Billet Quality

Pittsburgh

• • • **The controversy** over who will make concrete bars (IRON AGE, Jan. 14, Page 64) is continuing with billet mills assured of approximately 15 per cent of the total going concrete bar business against 90 per cent formerly.

According to Washington reports, new billet steel may be applied on concrete bar sizes of ¼-in., 1⅛-in., and 1¼-in. Where orders call for engineering requirements which cannot be met by rerolled rail steel, such orders may be taken by the billet mills regardless of sizes.

It is also said that where specific approval by the director of the WPB steel division has been obtained, concrete bars may be made from billet steel.

The above situation applies to the current volume of concrete bar business which in December totaled around 20,000 tons. During the heavy period last year concrete bar business ran well over 100,000 tons a month.

New OPA Amendment Hits Fabricated Concrete Reinforcing Bar Schedule

Washington

• • • **Effective Jan. 25,** OPA on Tuesday announced an amendment which makes several changes in the fabricated concrete reinforcing bar price Schedule No. 159.

Outstanding changes establish detailed conditions governing the application of maximum prices to lump sum and average price bids and contracts for furnishing fabricated steel bars used to reinforce structures made of concrete.

The amendment provides that lump sum and average-price bids must not be made at prices which are higher than the applicable maximum prices for the different quantities, sizes and specifications estimated by the bidder to be needed for the job covered by the contract. Further provision is made that after completion of the job, the contract price must be adjusted so that the total does not exceed the sum of the applicable maximum prices for the quantities, sizes and specifications used in carrying out the contract.

The amendment also has the following provisions:

The definition of "fabricator" is revised to include persons in the business of selling fabricated concrete reinforcing bars who maintain an engineering service and who buy and sell bars fabricated by others.

On a shipment directly from mill to job site, the only transportation charge which may be added in computing the maximum price is the lowest railroad charge from the applicable basing point to the job site plus 10c. per 100 lb. if a truck is used for any part of the shipment.

The maximum price section now includes "extras," which formerly were in a separate section, so that all components of a maximum price are brought under a single section.

Fabricators are now permitted to balance freight actually paid out and freight charged over a 12-month period and excess freight charge is to be "dissipated" by freight reductions during the ensuing three months.

The definition of "concrete reinforcing bar" is revised by substituting the simplified practice recommendations, the list of standard sizes and areas of bars ordinarily employed in reinforcing concrete.

Standard provisions dealing with petitions for amendment, licensing and taxes are incorporated into the regulation.

A provision permitting petitions for exception in instances of abnormal transportation costs is revoked because the transportation provisions of the regulation are believed to be adequate to deal with such problems.

The record-keeping section is amended to provide that records shall be preserved for as long as the price control act is in effect, or for the two-year period required heretofore, whichever is less.

•

Batt to Speak in Ohio

Cleveland

• • • **William L. Batt,** vice-chairman of WPB, will address the WPB clinic for small manufacturers of Northern Ohio on Jan. 27.

Aircraft Plant Under Army Air Force

• • • **The completed** units of the Cleveland Aircraft Assembly Plant this week were placed under the direction of the Army Air Force, with Major Roy L. Peck assigned as resident representative of both the Cleveland Aircraft Assembly Plant and the Cleveland division of Fisher Body, General Motors Corp. The transfer of authority marks a step in the progress toward actual production of Boeing bombers at the plant, which will be operated for the government by the Fisher organization. Actual production of planes has not begun yet.

"Technically," an Army spokesman at the plant stated, "'in production' means that installation of machine tools has started, and from an engineering standpoint the plant is in production. It will be some time before actual fighting aircraft will be coming off the assembly lines and be taken up for test flights."

A similar statement concerning the Willow Run Bomber plant being "in production" made early in 1942 was construed likewise to mean that planes were coming off the assembly line, but they weren't.

SMOKE SCREENS AND DOGS: At Wonalancet, N. H., U. S. sled dogs and U. S. soldiers are being trained for fighting in arctic climes. The tough huskies go through maneuvers and haul the sleds, drivers and arms through snow drifts and over ice. In this maneuver the sleds are being pushed through smoke screens as the men change firing positions.

International News Photos

CMP . . Recent Developments Regarding

These CMP Forms Are to Come

CMP-5—Assignment of your allotment number and the general authorization to purchase controlled materials.

CMP-5A— Extension of allotment form you use in passing your allotment to secondary consumers.

CMP-6 — Warrant for controlled materials, an authorization to purchase specific amounts of steel, copper or aluminum at the mill.

CMP-7 — Inventory report form to be used under Regulation No. 2.

CMP-8—The form to be used by producers of controlled materials to report their shipments and unfilled orders, beginning with the second quarter of 1943.

• • • **Study of CMP** Regulation No. 1, issued Jan. 11, shows additional interesting highlights besides those covered in last week's issue, page 94. They are described on these pages and include the distribution of simultaneous allotments, the placing of actual orders, the way to make adjustments, and so forth.

The Requirements Committee distributes available supplies of steel, copper and aluminum (the three products known as controlled materials) by making allotments to claimant agencies or industry divisions for each quarter. Each claimant agency distributes its allotments to prime consumers who produce Class A products. Allotments to makers of Class B products will be made by industry divisions. (The Class B list was published in this magazine Jan. 14, pages 78-81.)

Prime consumers make use of the portion of the allotment which they require and allot the remainder to secondary consumers producing Class A products. Allotments by secondary consumers to secondary consumers supplying them may be made in the same fashion. Advance allotments may be made by claimant agencies or industry divisions.

Bills of materials, showing controlled materials required by a consumer and his secondary consumers, are prepared on Form CMP-1, CMP-2 or CMP-3. Makers of Class A products apply for allotments on Form CMP-4A, and makers of Class B products on Form CMP-4B. A bill of materials or application for allomeent must not include requirements for maintenance, repair or operating supplies or controlled materials required for manufacture of Class B products which will be incorporated in the product with respect to which the bill of material or application is submitted. Bills of materials are compiled only when called for.

A consumer may make an allotment to his secondary consumer by either executing and returning one copy of CMP-4A; executing the application form if the application has been waived; affixing the prescribed short form of allotment to the delivery order; or telegraphing the information and confirming it.

Alternative procedure for simultaneous allotments.

A prime or secondary consumer who has several secondary consumers and finds it impracticable to determine exact allotments to be made to each of his immediate secondary consumers for their needs and those of their secondary consumers, may, at his option, make simultaneous direct allotments to each secondary consumer. Here is the procedure:

(1) The consumer who is to make the allotment (hereafter called the originating consumer) maintains a complete list of all secondary consumers making Class A products for incorporation in his product. He keeps this list current by requiring each secon-

Questions and Answers

Pittsburgh

• • • **At a recent** meeting here more than 1200 industrialists gathered to hear discussions on CMP. Below are a few of the questions asked at the meeting with answers that have been approved by the Washington Office of the WPB.

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Q.—How often and what constitutes the requirement of notifying the claimant agency of engineering changes?

A.—Each prime consumer must maintain bills of materials on all items on a current basis at all times, and must submit revisions indicating the effect of any changes which alter the total quantity of any material required during a month. Therefore, as materials are allotted for a quarter on a monthly basis, these changes should be reported as soon as possible.

•

Q.—If only when material is affected? (This relates to No. 1)

A.—Yes. The CMP is designed to assure a balance between the supply and demand of controlled materials, and, therefore, only changes in material and/or Class B Products Group 1 requirements in the case of a Class A Producer) should be reported.

Q.—Do prime consumers hold up their requirements until the requirements of secondary consumers are received for items listed Class B, Group 1?

A.—This question is not entirely clear to us. We will assume you are referring to the listing of requirements of a Class A Product on a bill of materials form in which event the secondary consumers will report their material requirements on CMP-1 (if a summary bill is being prepared) to their prime consumer, who will add his material requirements thereto. The secondary consumers' requirements of Class B. Group 1 products will be reported on CMP-3 Form, to which will be added the prime consumers' requirements. When the allotment is made by the claimant agency, it is forwarded to the prime consumer who passes down to his secondary consumers their material requirements and the preference rating accompanying the allotment will procure the required Class B products. Therefore, the prime consumer receives his requirements before his secondary consumers.

•

Q.—How are purchase orders placed?

A.—In the regular way. Many companies will place their purchase orders with their material suppliers in the normal way; however, no producer of controlled materials will be permitted to ship (after June 30, 1943) and con-

CMP Summarized Briefly Here . . CMP

dary consumer to report promptly to him any change with respect to the source of Class A purchased products.

(2) Immediately upon receiving an allotment, the originating consumer notifies each secondary consumer on the list (either directly or through intervening secondary consumers) of the authorized schedule for which the allotment has been made to him. The notice shall *not* include an allotment number. It must identify the product to be delivered by the secondary consumer and state the quantity to be delivered and the time when delivery is required.

(3) Promptly upon receipt of the preliminary notice, each secondary consumer shall report to the originating consumer directly the amount of each form of controlled material required by him each month in order to meet deliveries. Each secondary consumer shall include only his own requirements of controlled materials. No form is prescribed for the statement.

(4) The originating consumer then determines total requirement of all his secondary consumers under the schedule, checking the list to make certain a preliminary statement has been received from each.

(5) If summary shows the aggregate requirements of the originating consumer and all his secondary consumers for each form of controlled material do not exceed the allotment made to him, he may then allot directly to each secondary consumer on the list the amount indicated in the preliminary statement of requirements. No form is prescribed for such allotment, and it may be made by telegram, but it must include the complete allotment number and the statement: "This allotment is made in accordance with the alternative procedure for simultaneous allotments provided in paragraph (r) of CMP Regulation No. 1."

(6) If the aggregate requirements exceed the allotment with respect to any form of controlled material, the originating consumer shall not make any allotment or place any authorized controlled material order for the production schedule covered by his allotment until and unless:

(i) requirements have been revised by himself or by one or more of his secondary consumers to the extent necessary to eliminate excess, or

(ii) with permission of the appropriate claimant agency or industry division after he has reported the facts to it, he withholds an amount sufficient to cover all adjustments which must be made.

These CMP Forms Are Issued

CMP-1 — Summary Bill of Materials form.

CMP-2—Detailed Bill of Materials.

CMP-3—Indicates your requirements for Class B, Group 1 products and "government furnished equipment (GFE) to be used in conjunction with CMP-1 or CMP-2.

These three Bill of Materials forms are to be submitted only when specifically asked for by a Claimant Agency or a WPB industry division.

CMP-4A—Application for allotment of controlled materials for producers of A products.

CMP-4B—Application for allotment of controlled materials for producers of B products and for producers of certain A products used as repair parts.

CMP-4C—Application for allotment of controlled materials for construction and facilities projects.

(s) *Placement of orders with controlled materials producers.*

(1) An authorized order must

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trolled materials unless the order bears, or has been assigned an allotment number.

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Q.—How can one obtain necessary additional allotment due to excessive scrappage?

A.—See Question No. 17 in CMP Bulletin No. 1 issued Dec. 9, 1942, or Question No. 16 in Question and Answer Bulletin of Dec. 10, 1942, both of which refer to interim assistance under CMP.

•

Q.—When should any excess allotment be reported back to a claimant agency?

A.—As soon as possible. This plan is designed for the purpose of assuring the use and delivery of materials at the right time and place required. Severe penalties are provided for persons violating the provisions of the regulations governing allotments received in excess of requirements and not reporting the same.

•

Q.—How does one secure allotment for individual sale not originating from one of the government agencies?

A.—This will depend upon the type of product manufactured. Class A and Class B Group 1 products will practically all be made in accordance with schedules furnished by claimant agencies or industry divisions and, therefore, the production of such items will be required to meet the requirements of the war effort. *Allotments will be made only by Claimant Agencies* at the time of receipt of contract or schedule or approved application.

•

Q.—How do people obtain authority for placing purchase orders for items on Class B, Group 2?

A.—Class A producers: at the time of receiving their allotments of controlled materials will receive a preference rating. The rating will be used to procure the necessary Class B Group 2 items they, or their secondaries, will require. The same for Class B producers.

•

Q.—How often and how far in advance may allotments be asked for on new contracts whose delivery is required beyond 18 months?

A.—This depends upon how far in advance the claimant agency is willing to make advance allotments. Provision has been made for agencies to make such advance allotments.

•

Q.—Who originates the procedure for allotment of material; the claimant agency or manufacturer?

A.—The claimant agency if it requires a bill of materials, and if not required, the prime consumer will file an application for allotment when requested to do so by an agency.

CMP . . .

comply with this paragraph (s) or be declared authorized by WPB.

(2) A consumer who has received an allotment may place an authorized controlled material order with any controlled materials producer, unless otherwise specifically directed. An allotment to a prime consumer may include a direction to place orders with one or more designated producers. In such event the consumer shall use the allotment only to obtain controlled materials from the designated producers or to make allotments to secondary consumers, designating therein only producers named in the allotment received. Except as required by the allotment which he has received, no consumer shall impose any such restriction in any allotment made by him.

(3) A delivery order for any controlled material, other than steel castings, shall be accompanied by three copies of Form CMP-6. A consumer placing a delivery order for steel castings endorses the appropriate allotment number on such order, except that small amounts may be combined as provided in paragraph (k).

(4) An order must be in sufficient detail and must be received by the producer at such time in advance of the requested delivery date as is specified in Schedule III or at such later time as the producer may find it practicable to accept it. No producer shall discriminate between customers in acceptance of late orders.

(5) Controlled materials required for a production schedule which has not yet been authorized may be ordered for delivery before July 1, 1943, under applicable priorities regulations and orders, without placing an authorized order. Authorized controlled material orders take precedence over other orders to the extent provided in CMP Regulation No. 3.

(6) A delivery order placed before receipt of allotment and production schedule may be converted into an authorized controlled material order either by furnishing a copy of the order conforming to the requirements of this paragraph(s) or by furnishing in writing the requisite information, accompanied in either case by Form CMP-6. It is not required for orders for steel castings.

Adjustments on account of controlled materials or Class A products obtained without use of allotments.

Each consumer must reduce, in the manner provided in the regulation, any allotment received by him, to the extent that, either before or after receiving the allotment, he fills any of his requirements covered by the allotment through the acquisition of controlled materials or Class A products in any other manner than by use of the allotment, including without limitation:

(1) transactions covered by preference ratings (including those assigned on PRP Certificates or otherwise); (2) transactions not affected by preference ratings; (3) purchases from warehouses or retailers pursuant to CMP Regulation No. 4 or otherwise; (4) purchases pursuant to Priorities Regulation No. 13 or otherwise, from persons not regularly engaged in selling the material or product; (5) purchases on small orders pursuant to this regulation; (6) purchases of second-hand materials or products.

Adjustments for changes in requirements.

If a consumer's requirements for controlled materials or Class A products are increased after he receives his allotment, he should apply for an additional allotment from the person who made the same. If his requirements decrease, for any reason, he should cancel or reduce his allotment in

When Disputes Occur

• • • Disagreements over interpretations under CMP should be referred to the Inquiry and Service Branch, CMP Division of WPB, Washington.

Questions and Answers

Q.—What restrictions are placed on buying from warehouses?

A.—Await issuance of a CMP regulation which will cover this question in detail.

•

Q.—On scrapped materials, if such materials are returned to vendor for new parts, is it necessary to report such transaction?

A.—Toll agreements have not been the subject of much discussion to this writing, but it must be remembered that the consumers will be granted allotments of materials for new parts, and the use of scrap on a toll basis without reporting the same, would subject the consumer to a violation, he would have material in excess of requirements.

•

Q.—When and where do we obtain forms for bills of materials?

A.—If the Army requests such bills of materials, the forms will be supplied by them and will be headed "War Department." The Navy forms will be headed "Navy Department," etc. Industry Divisions of WPB will use CMP-1, 2, and 3 now in your office. However, regardless of who makes the request, the forms will always carry the same number and nature of request, i.e., CMP-1 Summary Bill of Materials; CMP-2 Detailed Bill, etc. Field offices will carry supplies of WPB Forms CMP-1, 2, 3, etc.

Q.—Are we prime consumers in all cases when dealing with any of the Government claimant agencies?

A.—Yes, if the claimant agency is your customer and you are manufacturing a specific procurement item. However, a manufacturer can be a secondary consumer if he is making a part for the account of a government owned shipyard or arsenal. Whether or not a person is a prime or secondary consumer depends upon who his customer is.

•

Q.—What provision is made for changes in design?

A.—This is a problem which only affects the respective claimant agency. Many changes are made in specifications by the various services; however, if such changes involve the use of more controlled materials, it will be the responsibility of such agency to see that the manufacturer receives an allotment of such material to compensate for the change in design.

•

Q.—What provision is made for small orders of odd requirements which cannot be secured from warehouse and which is too small for mill production, rolling schedules, etc.?

A.—We refer you to Question 19 in CMP Bulletin No. 1 of Dec. 9, 1942, or to Question No. 18 of the Dec. 10, 1942 Question and Answer book.

the manner provided in this regulation.

•

Restrictions on Uses Of CMP Allotments

• • • **Under CMP Regulation 1,** controlled materials or Class A products obtained under allotments cannot be used for any purpose except to fulfill the authorized production schedule. However, if permitted by the claimant agency or industry division, they may be used for other purposes. They may be used to restore inventories to a "practicable working minimum," replacing materials or products used in fulfilling the authorized schedule, subject to CMP Inventory Regulation No. 2. They may be used subject to Priority Regulation No. 13 or other WPB rules. These provisions do not require physical segregation of inventories used for different schedules if restrictions applicable to a specific lot of material or product are observed with respect to an equivalent amount of the same.

•

What to Do with New Forms Used Under CMP

• • • **For once WPB** has made form numbers easy to remember. Form CMP-4A will be used by producers of Class A products and CMP-4B will be used by producers of Class B products. CMP-4C is to be used for construction materials.

These are not bills of materials but production and purchase schedules. The new forms more or less parallel the old PD-25A.

This is what you do to get allotments of controlled materials for the April to June quarter:

File five copies with WPB by Feb. 9, making a separate application for each B product. You must also get requirements for Class A products which you incorporate from your supplier. Unless you can furnish materials requirements of these Class A products without asking your supplier, you must see that he gets a CMP-4A application form. On the CMP-4A which you send to each of your direct secondary consumers, you give your production schedule of the Class A products which you need to complete the production schedule of your Class B product. When your supplier has filled out the form, he will return it to you and you will eventually make allotment to him. Class B producers do *not* include requirements for other Class B products going into their finished product. On your own CMP-4B, you will consolidate the total requirements of yourself and all your secondary suppliers of Class A products as given to you on CMP-4A's.

Both manufacturers of Class A and Class B products file Form CMP-4B with WPB for materials for repair parts. So far, this is only the case where a manufacturer of a Class A product uses Form CMP-4B and files with WPB rather than with the Claimant Agency. The application does not include spare and repair parts directly purchased and programmed by Claimant Agencies. File a separate application for each general class of repair parts.

Producers May Appeal For Change of Status

• • • Any producer of Class B items may apply for permission to be treated as a producer of Class A products. A producer of Class A products making a large variety of items sold to many customers and whose allotments originate from several claimant agencies, may apply to be treated as a Class B producer. However, such permission will not be granted with reference to component parts or sub-assemblies unless bills of materials can be adjusted easily. Applications for reclassification should be filed with the CMP Division, WPB, Washington.

. . . CMP

Q.—Is a small company using not over $1,000 worth of metal per quarter for maintenance and repair only affected by this program?

A.—The answer to this question will be resolved with the issuance of the CMP Regulation dictating the permissible quantities to be released by warehouses on preference ratings only; also the maintenance, repair and operating supplies procedure.

•

Q.—Is the initiative with the prime consumer to accumulate application forms or should he await request and instructions from claimant agency?

A.—Await advices from the claimant agency. Such advices will be forthcoming in due course.

•

Q.—What should my company do in order to obtain authorization under CMP to expand plant or facilities?

A.—The CMP provides that responsibility for new construction and facilities will be placed on the claimant agency which benefits exclusively from the output. All cases in which benefit is shared by two or more agencies will be the responsibility of the industry divisions except as may be otherwise agreed by the agencies or determined by the program vice chairman.

Q.—Will any flexibility be included in the plan to take care of the last secondary consumer who may have made a mistake in his application?

A.—It is generally believed that each claimant agency will reserve some part of their overall allotment to take care of such contingencies. However, the agency should be notified of such errors immediately.

•

Q.—In view of the fact that complete operation under CMP will not begin until July 1, 1943, may my company choose to operate under PRP until that time? Until that date, may it refuse to make application or to receive allotments under CMP?

A.—No. Continued operation under PRP during the transition period is provided for not as an alternative to CMP but as assurance against maladjustment while problems of transition are being resolved.

•

Q.—To what Government agency should my company make application for industrial maintenance, repairs, and operating supplies under CMP?

A.—Your company should make no application for industrial maintenance, repairs, and operating supplies under CMP until it has been properly notified by the WPB to submit such requests.

PERSONALS

• **John Rosevear,** veteran engineer of 20 years' service, has been appointed staff assistant in the industrial engineering and equipment department of the Westinghouse Lamp Division, Bloomfield, N. J. **Eugene G. Haas** of the construction department will succeed Mr. Rosevear as superintendent of works engineering in charge of buildings, grounds and service. **Bernard H. Sullivan,** manager of sales for the Westinghouse Lamp Division, has been assigned responsibility for all commercial activities involving lamps and special products, and **Ralph C. Stuart** has been appointed manager of manufacturing and engineering for the division. These promotions follow the death of David S. Youngholm, vice-president in charge of the Lamp Division, on Dec. 4. **Samuel W. Chantler,** superintendent, and **Percy N. Love,** industrial relations supervisor, of the Canton Ohio Division of the Westinghouse Electric & Mfg. Co., East Pittsburgh, have been awarded the Westinghouse Order of Merit for their achievements in speeding war production.

• **Robert Gordon,** assistant treasurer, New York district, American Steel & Wire Co., has retired after 44 years of service. Mr. Gordon is succeeded by **Charles A. Johnson,** who has been credit manager in the New York district.

• **Robert H. Gibb,** for several years past a member of the Pittsburgh District sales organization of the Allegheny Ludlum Steel Corp. and recently assistant district manager, has been appointed district manager of that office.

• **John S. Morris** has been appointed methods engineer for By-Products Steel Corp., Coatesville, Pa. In his new position Mr. Morris will carry on special developmental work in connection with improved methods.

• **C. A. Thayer** has been named as consulting engineer for Republic Steel Corp. Mr. Thayer, who has held the position of chief engineer, is on leave of absence because of ill health. **R. H. Bahney,** formerly assistant chief engineer, has been made chief engineer of steel plants and mines, and **F. M. Darner** has been made chief engineer of manufacturing divisions.

• **Charles F. Billings,** for 19 years assistant superintendent of the Westinghouse Lamp Division plant at Trenton, N. J., has been appointed industrial relations manager of the division with headquarters in Bloomfield, N. J. Mr. Billings succeeds Walter F. Oliver who has been granted a leave of absence to become Director of the Civilian Personnel Branch, U. S. Army Ordnance Department in New York City.

• **Mac Short** was introduced as the 38th president of the Society of Automotive Engineers. Mr. Short was instrumental in forming the Stearman Aircraft Co., of Wichita, Kans., and for 10 years was vice-president and chief engineer. In 1937 he organized and became president Vega Aircraft Corp.

• **J. D. Shaw,** formerly research and production engineer with Metals Disintegrating Co., has joined the Aircraft Parts Development Corp., Summit, N. J., as chief powder metallurgist.

• **Taylor H. Beech,** former Pittsburgh representative for Darwin, Milner & Wheeling Bronze Casting, has been named technical analyst, tool steel branch of Steel Recovery Corp., Pittsburgh.

• **H. E. Eckman,** plant superintendent, has been made plant manager of Piper Aircraft Corp., Lock Haven, Pa. Other promotions made include: **Findley A. Estlick,** general plant superintendent, and **Richard C. Barber,** assistant plant superintendent.

• **E. W. Gellatly** has been made director of personnel, American Bosch Corp., Springfield, Mass.

• **Dr. Nicholas N. T. Samaras** and **Roy W. Sudhoff** have been promoted to assistant directors of the central research department of Monsanto Chemical Co., Dayton, Ohio.

• **J. H. White, Jr.,** former assistant superintendent at Rheem Mfg. Co.'s Birmingham plant, has been promoted to superintendent. Mr. White succeeds **W. C. Heaslip,** who has been transferred to the company's general engineering department at Baltimore.

• **J. J. Phifer,** assistant general superintendent of Fairfield Steel Works, Tennessee Coal, Iron & Railroad Co., Birmingham, has been appointed general superintendent of the Works. Mr. Phifer replaces **J. M. Spearman,** lately made assistant to vice-president in charge of manufacturing operations. **Dudley Vaughn,** superintendent of the open hearth department at Fairfield, has been named to succeed Mr. Phifer as assistant general superintendent of the Works, and **A. J. Blair,** head of the geological department, was assigned to report to **A. B. Haswell,** newly-appointed assistant to vice-president in engineering and construction.

• **A. G. Dennison** has joined the staff of Wolverine Tube division of Calumet & Hecla Consolidated Copper Co., Detroit, in charge of the Washington office.

• **Gordon F. Hess,** since 1939 district sales manager at Houston, Tex., has been named district sales manager of Republic Steel Corp. at Detroit, succeeding Arthur Schaeffer, who is retiring.

• **Stephen E. Husted,** assistant manager of sales for Bethlehem Steel Co. at Philadelphia, has been transferred to the same position in the company's Baltimore office. His post at Philadelphia will be taken by **Northrup Jones** of that sales department.

• **Calvin P. Hensley,** for the past 24 years district manager for Jones & Laughlin Steel Corp. has retired as of Jan. 1.

OBITUARY . . .

• **C. V. Lauer,** senior assistant superintendent of blast furnaces, Gary works, Carnegie-Illinois Steel Corp., died Dec. 28. He had been ill at home for several weeks with a recurrent heart ailment. He was 46 years old.

• **G. H. Blakeley,** former vice-president of the Bethlehem Steel Co., died Dec. 25 after an illness of two years. He was 77 years old.

• **John Coolidge Davenport,** pioneer designer of electrical starters and large transformers, who has been head of the contacts division of the electrical department at Allis-Chalmers Mfg. Co., Milwaukee, for many years, died Dec. 19.

• **George Richard Kahrs,** salesman in the Buffalo office of the American Rolling Mill Co., died Jan. 4. Mr. Kahrs joined the Armco organization in February, 1928, and after a period of training he became established in the Buffalo territory.

• **Harold K. Jackson,** sales manager for the northern district, Mid-West Forging & Mfg. Co., Chicago, died at his home in La Grange, Ill., Dec. 11, aged 47.

MACHINE TOOLS

. . . *Sales, Inquiries and Market News*

American Propeller Increases Plant Capacity

Toledo

• • • **Present plant capacity** of American Propeller Corp. here will be increased through the purchase and installation of additional machinery and equipment, it was announced by William F. Wise, president of American Propeller Corp. and executive vice-president of the Aviation Corp. With the acquisition of the additional equipment, American Propeller will become the largest hollow steel propeller blade manufacturing plant in the country.

Production of propeller blades which are used on bombers of the U. S. Army Air Forces has increased consistently every month since the plant was completed this past summer and shipments are now approximately two months ahead of contract schedules. Production for December was 40 per cent greater than for the month of November.

American Propeller hollow steel blades are forged from chromium-nickel-molybdenum seamless steel tubing. These blades have greater resistance to corrosion and abrasion, and in the larger sizes, are lighter than aluminum blades.

•

New Business Modest

Cincinnati

• • • **The local machine tool** market shows no change from previous weeks. Manufacturers indicate that cancellations of orders are still coming in with a modest amount of new business reported. While no announcement has been made of the results of renegotiation of contracts, a number of the plants are very busily engaged with price revision boards, while governmental agencies have indicated a strong desire to get all contracts renegotiated prior to the income tax reporting period.

No change is being noted in the steady production in district plants and backlogs are still sufficient to sustain production well beyond the summer period, with some plants confident of capacity production throughout the year. A number of plants, however, are giving quite a bit of consideration in their engineering and drafting departments to postwar machinery, so that they will be prepared when the present conflict ends.

•

Fresh Machinery Buying Begun by Aircraft Industry

Cleveland

• • • **The past two weeks** have marked the beginning of further expansion of facilities for the production of aircraft and aircraft parts, with large orders for machine tools being placed by such manufacturers. It is yet too early to estimate how extensive this new ordering will be or what its effect on machine tool builders' backlogs will be. One large manufacturer of aircraft engine parts in this area came in this week for substantial numbers of millers, cylindrical and surface grinders, alkali washing equipment, heat-treating furnaces, and heavy drilling and boring machines. This would indicate that new and larger contracts for engine parts made by this company have been placed with them in quantities far above what was produced by the company during the past year, when production schedules and quotas were met.

N. Y. Machinery Dealers To Uncover Idle Equipment

New York

• • • **Plans for setting up** a non-profit clearing house for idle machine tools were developed last week at a meeting of the New York Chapter of the Machinery Dealers' National Association. According to Herbert Segal, chairman of the local group, offices will be set up at 21 East 40th Street on Feb. 1 and a committee will set to work to trace sales of machinery made by dealers to non-essential industries. Where the equipment is found to be idle, the owner will be urged to sell or lend it to the government or a contractor.

"The WPB is doing a good job," Mr. Segal said, "but is understaffed as far as practical men are concerned. We know that with our help, the WPB will be able to uncover large quantities of machinery.

Mr. Segal pointed out that often manufacturers with idle machinery were reluctant to part with it because they were bidding on war work themselves. It is necessary to check such manufacturers to see whether such contracts are obtained or whether the equipment is still idle. He estimated that the local group could uncover 2000 idle machines.

Industrial Gear Sales Declined in December

• • • Sales of industrial gears during the month of December dropped 16½ per cent below the November figure, according to the American Gear Manufacturers Association. The December figure is 23½ per cent above the corresponding month of 1941. For the twelve months of 1942 sales were 32 per cent higher than they were in the same period last year. The index figure does not include production of automotive gears or gears used in high speed turbine drives.

NON-FERROUS METALS

. . . Market Activities and Price Trends

Ickes Assails WPB for Blocking Metal Expansion

• • • **In vigorous testimony** before the Senate Small Business Committee, Secretary Harold L. Ickes charged the WPB and RFC with having held up expanded production of such ores as manganese, copper, zinc and chromium.

The Secretary's appearance before the Senate group was for the purpose of discussing the relationship of the country's metal and mineral resources to the war effort. He was asked to testify after WPB and Army spokesmen had cited shortages of raw materials as the reason small business is not getting war contracts.

"Small business, mineral ores and metals," Ickes declared, "compose one problem. Small business is needed to get ores out of the ground and to fabricate metals. Without the metals of these ores, small business cannot operate."

Ickes told the committee that the Bureau of Mines had discovered reserves totaling 10,000,000 tons of manganese ores, 8,000,000 tons of bauxite, 6,000,000 tons of low-grade nickel, 4,000,000 tons of chromite ore, 2,000,000 tons of antimony ore, 1,000,000 tons of tungsten ore and 1,000,000 tons of mercury ore. But the policy of importing raw material still persists, Mr. Ickes complained. Each effort of the bureau to force increased production of metals peters out somehow in the WPB. "And it isn't a simple matter of dealing with definite refusals."

Secretary Ickes said a copper program which if put into operation would provide 50,000 tons of this metal annually had been offered by the Interior Department but it has not received WPB support because of an apparent reluctance to make relatively small expansions at a number of plants.

"On aluminum, he continued, the department has urged from the outset of the emergency that in addition to active exploration for bauxite, clays and alunite be developed to provide alumina for aluminum production. As early as August, 1942, the department recommended an integrated aluminum program worked out to fill our aluminum needs through 1948 by using alunite and clays in addition to imported and domestic bauxites. As a result, a single plant in Utah is now about ready for production, which will, when completed have a capacity of only 100 tons per day of aluminum from alunite.

WPB Foresees Less Lead Available for 1943

• • • Lead supply in 1943 is expected to be somewhat below that of 1942, the decrease being both in imports and domestic mine production, Erwin Vogelsang, director of WPB Tin-Lead Division, told the Lead Producers Industry Advisory Committee's Washington meeting Jan. 14. This year's supply will cover presently known requirements, and leave a margin for stockpile, he said, though additional substitution of lead for other more critical materials might cause a curtailment of less essential uses.

Lead will not be imported from Canada and Australia in 1943 as has been done previously and South American lead imports are taking second place in shipping to more critical materials.

Non-Ferrous Prices

(Cents per lb. for early delivery)

Copper Electrolytic, Conn. Valley	12.00
Copper Electrolytic, New York	11.75
Copper, Lake	12.00
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.67
Lead, St. Louis	6.35
Lead, New York	6.50

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 15c.-16c. a lb.; No. 12 remelt No. 2, standard, 14.50c. a lb. NICKEL electrolytic, 35c.-36c. a lb. base refinery lots of 2 tons or more. ANTIMONY, prompt; Asiatic, nominal, New York; American, 14.50c. a lb., f.o.b. smelter. QUICKSILVER, $197 to $199 per 76 lb. flask, f.o.b. shipping point. BRASS INGOTS, commercial 85-5-5-5, 13.25c. a lb.

Salvage Drive in Power Industry Yields Much Needed Copper

• • • **Continuous programs** for salvaging metals plus scrap drives in the electric power and light industry have supplied 24,000,000 lb. of copper together with large amounts of aluminum, brass, lead, zinc and other materials, according to a survey conducted by the Edison Electric Institute among the nation's electric companies.

The copper sold to scrap dealers and mills represented about 10 per cent of the normal annual copper requirements of the electric industry, one of the largest peacetime consumers of the metal.

So intensive have the scrap drives been that it is estimated that 1943 copper salvage will probably only reach half the tonnage collected in 1942. Contributing also to the expected drop in the quantity of copper reclaimed has been the decrease in the amount of copper used by the utilities through the introduction of substitutes and reprocessing.

•

U. S. Delegation Will Study Bolivian Mining Conditions

• • • **An investigating commission** appointed by the United States Government to determine the causes of the recent strike in the tin mines of Bolivia has been reported to be planning to leave for that South American country soon. According to the report this five-man delegation consists of Charles R. Hook, of the American Rolling Mill Co., for the employers, Robert Watt of the AFL for labor and three unannounced persons representing the public, the Board of Economic Warfare and the Office of the Coordinator of Inter-American Affairs.

Much speculation is going on as to what official agency has been the prime mover in appointing this commission since Under-Secretary of State Sumner Welles last week denied that Pierre de Boal, American Ambassador to Bolivia, had ever taken any action that could be construed as trying to influence the Bolivian Government in applying its labor code.

However, Lombardo Toledano, president of the Confederation of Latin American Workers, appealed about two weeks ago to Henry A. Wallace as chairman of the Board of Economic Warfare to help settle the recent strike in the Patino mines. Toledano after his visit to Bolivia declared, according to a dispatch from Allied Labor News dated Dec 3, ". . . If output is to be increased and the Fifth Column deprived of one of its chief arguments against hemispheric unity, wages must be raised immediately to provide a decent standard of living. . . . Low wages and bad housing conditions are responsible for the high labor turnover in the mines and the low rate of labor productivity."

Dr. Eduardo Fajardo, secretary of the company, stated that his workers were the highest paid in Bolivia.

During the strike at the Catavi tin mines, which lasted from Dec. 18 to Dec 23, 19 persons were killed and 30 wounded in a clash between military forces and the workers, government sources at La Paz, Bolivia, revealed. After government assurance that it would investigate the workers' demands for wage increases, the strikers resumed their jobs Dec. 24.

Labor Management Conference Will Study Labor Stabilization

• • • **The War Manpower Commission is planning a labor-management conference for Jan. 18 and 19 to review progress and consider modifications in the employment stabilization plan for non-ferrous metal activities in 12 western states. The meeting will be held in Denver with Fowler V. Harper, deputy chairman of the commission acting as chairman. Invitations to attend this conference have been sent to leading representatives of management and labor in the field and to interested departments and agencies of the federal government. The original plan provided for the calling of such a conference to consider the plan in the light of experience and to make such modifications as may be required to meet the problem of war production and to avoid hardships and injustices to employers and employees.**

SCRAP

. . . Market Activities and Quotation Trends

Scrap Trade Encouragement Held • Best Move of the Year

• • • **A move by OPA,** announced last week-end, to alter the spread allowable for preparation of scrap was hailed by the trade as one of the most encouraging signs so far and certainly the best move of the year. In summary, the changes increased the differential between unprepared scrap sold to the consumer and prepared heavy melting steel, increasing to $3.50 from $2.50. In addition, certain changes in grade specifications and in provisions governing brokerage commissions were made.

For complete details of Amendment No. 10 to Schedule No. 4 altering the maximum prices for scrap, see page 90.

First notice of the impending change came with an announcement of the fact by OPA's Donald D. Kennedy at the 13th annual convention of the Institute of Scrap Iron and Steel in New York, Jan. 15-16. Benjamin Schwartz, chief of the Scrap Metals Section of BEW, revealed this week at the same convention that this country was receiving scrap from 20 foreign countries at present and anticipated adding more foreign sources in the near future.

He pointed out that every effort was being made to have as much of this scrap as possible arrive in prepared form, thus utilizing foreign labor and saving our own manpower. His view of the future for the scrap industry was very bright based on the opinion that the government would act to conserve iron ore after the war and thus add importance to the economies of using scrap.

• • • **Manpower continues** to be the scrap yard's biggest headache. While the situation is general, St. Louis in particular reports an acute shortage of workers and reports common labor wages of 50 to 60c. an hour with burners and cranemen getting at least $1. Overtime builds these rates up to high salaries. Along with the shortage handicap, an inferior grade of worker is reported as prevalent.

Navy Wants 20 Scrap Men

• • • The Navy needs 20 scrap men, one for each Naval district, Lieut. Comm. J. C. Stone, Naval procurement officer, told members of the Institute of Scrap Iron and Steel at their convention on Sunday. They must be between 35 and 45 years old, experienced in both ferrous and non-ferrous scrap, and must have worked for firms doing a business of $1,000,000 or more a year. Members of the industry believe it will be difficult to find 20 men filling these requirements.

Salvage Division Gets New Deputy

Washington

• • • **J. Widman Bertch,** formerly Chief of the WPB Special Projects Salvage Branch, has accepted the position of Deputy Director for the entire Salvage Division. Replacing Mr. Bertch as chief of the Special Projects Salvage Branch is Arden Yinkey, Jr., who was formerly his deputy.

•

Connley Named Conservation Chief

• • • **Howard Connley,** former NAM president and chairman of the Board of Walworth Co., has been named by Ernest Kanzler, WPB Director General for Operations, as Director of the WPB Conservation Division. Harvey A. Anderson, chief of the division's Conservation and Substitution Branch, has been made deputy director.

•

CLEVELAND — Scrap supplies at the mills have fallen off a bit during the past two weeks because of cold weather. Stocks are now estimated to be about five weeks at the mills. Supplies moving into Valley mills have been sufficient to

increase mill stocks slightly. Concern is being given the changes in the differentials on turnings and borings, but any tangible results of these changes will not be apparent for several weeks it is believed.

•

PHILADELPHIA — Light steel for bundling, and heavy breakable cast continue in greater demand than supply, while nickel turnings and foundry grades continue difficult to dispose of. The last open orders were cleaned up this week for the two largest pipe foundries in the district.

•

CHICAGO—The cold weather and snow are slowing turnover in scrap yards but most mills are fairly comfortable with respect to near term needs. One mill has recently been aided by an allocation order. There is still considerable unprocessed light scrap around, which is difficult to move but all mills are still interested in adding to supplies of prime melting steel.

•

PITTSBURGH — Some consumers are still dipping into inventory to make up for the recent falling off in collections. No mill is in serious condition, however, but prolonged severe weather will change this situation overnight.

•

BUFFALO — Operations in Buffalo yards ran below normal this week because of poor working weather and the continued lack of adequate manpower. The area's biggest consumer, which last week closed its gates on further deliveries of scrap turnings, added a ban on blast furnace items, such as borings, this week. All ingot producers appear to have fair reserves of scrap.

•

CINCINNATI — The price situation in the district market is somewhat confused. There is a noticeable tendency on the part of the consumers to buy under ceiling prices and this is causing some concern among the various agencies dealing with procurement. Supply of material appears to be in good shape and the anticipated stringency has not yet appeared. Dealers are now anticipating a reasonably comfortable period so far as the supply is concerned.

•

BIRMINGHAM — All grades of scrap remain relatively plentiful in this district. Material collected in the civic drives of last fall is still going through some dealers' yards here.

•

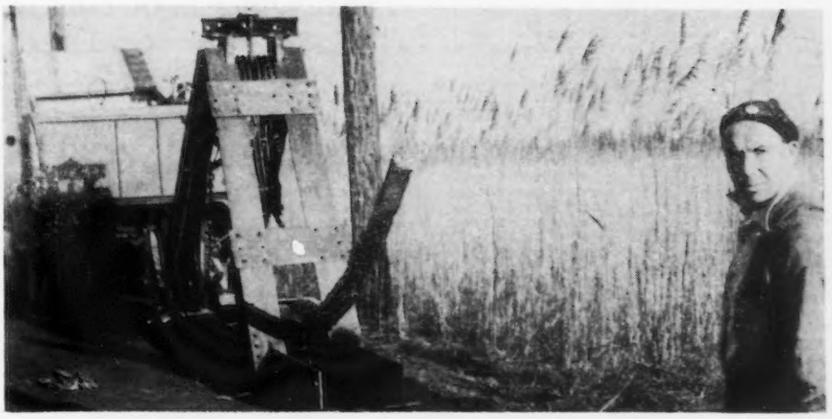
BOSTON — Weather conditions have been more favorable for yard activities, but there is no snap to the trade. A round tonnage of light street car rails on Columbus Ave., Boston, is being salvaged. War Materials, Inc., is about to approve removal of 4500 gross tons from Hartford, Conn., streets, and has approved removal of 850 tons from Waltham, Mass. Scrapping of 11,500 tons of Springfield, Mass., rails is held up because of lack of tar.

•

NEW YORK—The industry here is in the January doldrums, with both sales and supply slow. Nickel turnings have, rather abruptly, become a drug on the market. This is attributed to the fact that with plants reaching peak production, enormous quantities of the turnings are being produced. Heavy breakable cast remains in great demand, with little call for foundry grades of cast.

•

ST. LOUIS—Manpower shortage in the scrap iron yards here is becoming increasingly serious. Experienced men either have joined the armed forces or gone into war jobs at higher pay and most of the men who remain on the job are inefficient. Result has been a piling up of inventories. Despite the small receipts, common laborers are being paid from 50 to 65c. an hour while crane men and burners receive $1 an hour. Overtime made necessary by the small forces brings the wage even higher. Winter storms added to the difficulties this week. There has been talk of job freezing but nothing has been done.



STIEFEL RAIL REMOVER: This is the remover used in New Jersey, developed by Fred W. Stiefel Associates, New York. When the rail end is drawn up, a roller is slipped under it and into bearings in the T-beams. The rail is skimmed from the pavement while the truck moves forward. Application for patent has been made. Other types of rail removers have been shown in this magazine from time to time, as on June 11 and July 30, 1942.

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(The prices shown on this page do not reflect the changes made by Amendment No. 10 to Revised Price Schedule No. 4 which are effective Jan. 22, 1943.)

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES		ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES										
					Low Phos.		Heavy Structural and Plate			Cut Auto Steel Scrap					
	(No. 1 Heavy Melting; No. 1 Hydr. Compressed Black Sheets, No. 2 Heavy Melting; Dealers' No. 1 Bundles; Dealers' No. 2 Bundles; No. 1 Busheling)	Unbaled* Machine Shop Turnings	(Mixed Borings and Turnings; Shovelling Turnings; No. 2 Busheling; Cast Iron Borings)	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	3 ft. and Under	2 ft. and Under	1 ft. and Under and Auto, Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$16.00	$16.00	$17.50	$25.00	$22.50	$21.00	$21.50	$22.00	$20.00	$20.50	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	15.50	15.50	17.00	24.50	22.00	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Pt.	18.75	14.75	14.75	16.25	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	15.50	15.50	17.00	24.50	22.00	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	15.25	15.25	16.75	24.25	21.75	20.25	20.75	21.25	19.25	19.75	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	14.25	14.25	15.75	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	14.00	14.00	15.50	23.00	20.50	19.00	19.50	20.00	18.00	18.50	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	13.85	13.85	15.35	22.85	20.35	18.85	19.35	19.85	17.85	18.35	18.85	15.85	17.35	18.85
Toledo, Ohio	.....	13.85	13.85	15.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis, Mo.	17.50	13.50	13.50	15.00	22.50	20.00	18.50	19.00	19.50	17.50	18.00	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburgh, Cal.; San Francisco	17.00	13.00	13.00	14.50	22.00	19.50	18.00	18.50	19.00	17.00	17.50	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	12.50	12.50	14.00	21.50	19.00	17.50	18.00	18.50	16.50	17.00	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	10.50	10.50	12.00	19.50	17.00	15.50	16.00	16.50	14.50	15.00	15.00	12.50	14.00	15.50

•Baled turnings are $4 per gross ton higher. Dealers may charge $2 per ton for crushing other than heavy turnings. An industrial producer may charge $1.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles; No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK city or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.65 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 55c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Claymont, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburg, Cal., 42c.; Middletown, 14c.; Sparrow's Point, 11c.; Chicago, 84c.; Detroit, 53c.; Alabama City, 26c.; Minnequa, 22c.; Seattle, 38c. *At Cincinnati, for basic open hearth grades, cut auto scrap and auto springs and crankshafts, deduct 80c. per ton.

PITTSBURGH basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakland, Cal.

MAXIMUM prices of inferior grades shall continue to bear same differential below corresponding grades as existed during the period Sept. 1, 1940, to Jan. 31, 1941. Superior grades cannot be sold at a premium without approval of OPA. Special preparation charges in excess of the above prices are banned. Whenever any electric furnace or foundry grades are purchased for open hearth or blast furnace use, prices may not exceed the prices above for the corresponding open hearth grades.

MAXIMUM SHIPPING POINT PRICE—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad car or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. In lieu of dock charge add 75c. a ton*, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.* For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $2.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less the maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge $2.50 per ton on consumer-owned unprepared remote scrap (see order). A preparation-in-transit charge for allocated unprepared scrap is provided.

Maximum price of all scrap in a vehicle is that of the lowest price grade in the shipment. This limitation does not apply to vessel shipments if grades are segregated.

Where scrap is to undergo preparation prior to its arrival at the point of delivery, such scrap is not at its shipping point, as that phrase is defined above, until after preparation has been completed. For special preparation charges, consult official order.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1 per cent oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c.

UNPREPARED CAST IRON SCRAP—Except for heavy breakable cast, unprepared scrap is given a price ceiling of $2.50 per ton less than the maximum prices for the corresponding grade of prepared cast iron scrap. Where scrap is to undergo preparation prior to arrival at the point of delivery, such scrap is not considered at shipping point until preparation is completed.

Consumers of cast scrap may pay the shipping point price plus established charge for transporting the scrap to their plants. In the case of deliveries by truck, the cast scrap buyer must obtain from the seller a certification, made out to OPA.

*At Memphis 50c.; Great Lakes ports $1; New England $1.25.

RAILROAD SCRAP

	No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	Scrap Rails: 3 ft. and Under	Scrap Rails: 2 ft. and Under	Scrap Rails: 18 in. and Under
Cleveland, Cincinnati, Ashland, Portsmouth, Middletown	$20.50	$21.50	$23.00	$23.50	$23.75	$24.00
Canton, Pittsburgh Sharon, Steubenville, Wheeling, Youngstown	21.00	22.00	23.50	24.00	24.25	24.50
Chicago, Philadelphia, Sparrows Pt., Wilmington	19.75	20.75	22.25	22.75	23.00	23.25
Birmingham, Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
Kokomo, Ind.	19.25	20.25	21.75	22.25	22.50	22.75
Seattle	15.50	16.50	18.00	18.50	18.75	19.00
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00

CAST IRON SCRAP

	Group A	Group B	Group C
No. 1 cupola cast	$18.00	$19.00	$20.00
No. 1 machinery cast, drop broken, 150 lbs. and under	18.00	19.00	20.00
Clean auto cast	18.00	19.00	20.00
Unstripped motor blocks	17.50	18.50	19.50
Stove Plate	17.00	18.00	19.00
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Misc. Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas Oklahoma, Texas and Florida.

Group C: States not named in A and B; switching district of Kansas City, Kan., Mo.

AMERICAN IRON AND STEEL INSTITUTE

350 Fifth Avenue, New York City — December, 1942 (Month)

Blast Furnace Capacity and Production—Net Tons

	Number of companies	Annual blast furnace capacity	Production: Pig iron — Current month	Pig iron — Year to date	Ferro manganese and spiegel — Current month	Ferro manganese and spiegel — Year to date	Total — Current month	Total — Year to date	Percent of capacity — Current month	Percent of capacity — Year to date
DISTRIBUTION BY DISTRICTS:										
Eastern	12	11,967,680	985,519	11,303,812	21,572	234,710	1,007,091	11,538,522	99.3	97.2
Pittsburgh-Youngstown	15	24,346,420	2,113,249	24,250,474	20,784	233,640	2,134,033	24,484,114	103.4	100.5
Cleveland-Detroit	9	6,068,470	532,161	6,162,398	-	-	532,161	6,162,398	103.4	102.0
Chicago	6	12,954,800	1,087,355	12,663,024	-	49,997	1,087,355	12,713,021	99.0	98.3
Southern	7	4,521,910	346,195	4,116,177	15,238	124,886	361,433	4,241,063	94.3	96.6
Western	2	822,800	79,350	838,850	-	4,189	79,350	843,039	113.8	94.0
TOTAL	37	60,682,080	5,143,829	59,334,735	57,594	647,422	5,201,423	59,982,157	101.1	99.2

• • • Pig iron production in December rose to 5,143,829 net tons from 5,026,220 tons in November, according to reports from the American Iron and Steel Institute representing 99.8 per cent of total blast furnace production. Output of ferroalloys fell off slightly during December, amounting to 57,594 net tons compared with 57,707 tons the previous month. Yearly production, including ferroalloys, reached 59,982,157 net tons, almost four million more tons than last year's total of 56,062,510 net tons. In December furnaces worked at 101.1 per cent of capacity, a slight decrease from last month's rate of 101.8 per cent.

Trade Notes . . .

Perfex Gage & Tool Co.'s new plant at 3603 Gaylord Ave., Detroit, has been completed. It was built expressly for the manufacture of gages. With 10,000 ft. of floor space and the latest type of equipment production facilities have been greatly increased.

•

Electric Furnace Co.'s Detroit district representative, B. C. Thompason, has moved his sales offices to 6911 Courville Road, Detroit.

•

Barrett and Hilp, general contractors of San Francisco have appointed A. E. Nelson Co. as their agency to handle all advertising and public relations activities.

•

Ohio Seamless Tube Co., Shelby, Ohio, has moved its west coast sales and service engineer, Irving F. Pohlmeyer, to new quarters. He is now located at Suite 200, 170 South Beverly Drive, Beverly Hills, Cal.

•

Matam Corp. has moved its main offices to 45-17 Pearson St., Long Island City, N. Y.

•

Severance Tool, Inc., has been formed in Saginaw, Mich., to take over the operations of all Severance Tool Co. service branches. The plants, which are a part of the new corporation, are located in Los Angeles, New York, Chicago, Detroit and Fort Wayne, and a new plant is being opened in Springfield, Mo.

•

Van Alstyne, Noel & Co. has moved its New York office to 52 Wall St.

•

William Jessop & Sons, Inc., has moved its Chicago office and warehouse to 1724 W. Carroll Ave.

•

Singer Steel Co., Cleveland, announces the opening of its Detroit branch at 7310 Woodward Avenue. District manager will be Robert L. Herman.

•

Weaver Mfg. Co. has moved its office and factory to Maytown Ave., Elizabethtown, Pa.

Tubular Service Corp. has moved its general offices from Brooklyn to 32 Broadway, New York, and in cooperation with the U. S. Army Engineer Corp. is moving its New York district warehouse from Bush Terminal, Brooklyn, to 415 W. 127 St., New York. The company also has moved its Detroit offices to 7330 Oakland Ave.

•

Industrial Limestone Products Co. has been formed to distribute high calcium, high magnesium, limestone and lime products. The new company is located at 732 Frick Building, Pittsburgh.

•

Reconstruction of the Pennsylvania Railroad bridge at Washington has been awarded to Bethlehem Steel Co. The job calls for 5000 tons of steel.

•

A complete industrial plant, comprising administration, service, and manufacturing buildings, is being constructed for National Carbide Co. by Rust Engineering Co., Pittsburgh. Contract for design and construction amounts to less than $1,500,000.

•

Effective Dec. 31, 1942, The Charles F. Elmes Engineering Works became a part of American Steel Foundries, Chicago. The present Elmes organization will remain intact and will operate as a separate unit. Charles F. Elmes will remain as general manager.

•

Ferbert-Shorndorfer Co., industrial paint manufacturer, Cleveland, has been acquired by American-Marietta Co., Chicago. It will be operated as an American-Marietta subsidiary.

•

Wilson & Bennett Mfg. Co., 6532 S. Honard Avenue, Chicago, will now be known as Inland Steel Container Co. The company is a subsidiary of the Inland Steel Co.

• • • While the "Prices of Finished Iron and Steel" page was omitted from the Jan. 7 issue of this magazine, prices were unchanged from the previous week.

American Measuring Instruments Corp. is now located at 240 West 40 Street, New York.

•

Federal Telegraph Co. and **International Telephone and Radio Mfg. Corp.** have merged to form the Federal Telephone and Radio Corp. which will continue the operation of the existing factories and research laboratories with the following three main divisions: Radio Division (formerly Federal Telegraph Co.), Newark; Telephone Division (formerly International Telephone & Radio Mfg. Corp.), East Newark, N. J.; Research Laboratories, New York.

•

Walter Bates Co., Inc., has moved its general office to 1707 Rowell Avenue, Joliet, Ill.

Central Scheduling Among Tolan Committee Demands

Washington

• • • Calling for a master civilian board for mobilization of industry and demanding central scheduling as to component parts and end products, the House Tolan Committee Investigation National Defense Migration recently submitted its final reports. It recommends that small business be preserved through vigorous efforts by the government and demands that legislation be passed to take care of migratory workers in the postwar period. The handling of manpower to date was declared inadequate.

"Those who are advocating the application of a strait jacket upon either production or manpower are living in the past," the committee said. "This is not a war we can win without surplus energies."

Comparison of Prices . . .

Advances Over Past Week in **Heavy Type**; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	Jan. 19, 1943	Jan. 12, 1943	Dec. 21, 1942	Jan. 20, 1942
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Jan. 19, 1943	Jan. 12, 1943	Dec. 21, 1942	Jan. 20, 1942
No. 2 fdy., Philadelphia	$25.89	$25.89	$25.89	$25.84
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	24.68	24.68	24.68	24.06
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.39	25.39	25.39	25.34
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	31.34	31.34	31.34	31.34
Ferromanganese‡	135.00	135.00	135.00	120.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melting steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	23.00
No. 1 cast, Pittsburgh	20.00	20.00	20.00	22.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	24.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$6.00	$6.00	$6.00	$6.125
Foundry coke, prompt	6.875	6.875	6.875	6.875
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	5.70
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, to be published in the Jan. 28 issue.

Composite Prices . . .

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Jan. 19, 1943	2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1942	2.30467c.,	2.30467c.,	$23.61	$23.61	$19.17	$19.17
1941	2.30467c.,	2.30467c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 9
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99629c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

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MOLYBDENUM
CORPORATION OF AMERICA

Grant Building, Pittsburgh, Pa.

Prices of Finished Iron and Steel...

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, reductions, and in most cases freight absorbed to meet competition. Delivered prices do not reflect new 3 per cent tax on freight rates.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars [10]	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.22¢	2.35¢	2.28¢
Cold rolled [1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.17¢	3.41¢	3.39¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.75¢	3.68¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.47¢	3.73¢	3.69¢
Long ternes [2]	3.80¢		3.80¢									4.55¢		4.18¢	4.14¢
STRIP															
Hot rolled [3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.22¢	2.48¢	
Cold rolled [4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.92¢	3.18¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.58¢	
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.07¢	3.33¢	
TIN MILL PRODUCTS															
Coke tin plate, base box	$5.00	$5.00	$5.00						$5.10					5.38¢	5.34¢
Electrolytic tin plate, box	$4.50		$4.50												
Black plate, 29 gage [5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ [12]			3.39¢
Mfg. ternes, special box	$4.30	$4.30	$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.52¢	2.80¢	2.27¢	2.51¢	2.49¢
Rail steel [6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.52¢	2.80¢			
Reinforcing (billet) [7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.52¢	2.55¢ [13]	2.27¢	2.40¢	
Reinforcing (rail) [7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.52¢	2.55¢ [13]	2.27¢		2.49¢
Cold finished [8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70c)					3.01¢	2.99¢
Alloy, hot rolled	2.70¢	2.70c				2.70¢	Bethlehem, Massillon, Canton = 2.70c)						2.82¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.47¢		
PLATES								(Coatesville and Claymont = 2.10¢)							
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.25¢ [11]		2.47¢	2.65¢	2.33¢	2.30¢	2.155¢
Floor plates	3.35¢	3.35¢									3.72¢	4.00¢		3.73¢	3.69¢
Alloy	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.97¢	4.15¢		3.71¢	3.60¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem = 2.10¢)				2.47¢	2.75¢		2.28¢	2.22¢
SPRING STEEL, C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
WIRE [9]															
Bright [14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70c)					3.10¢			2.94¢
Galvanized	add proper size extra and galvanized extra to bright wire base, above.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢			3.54¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.74¢

[1] Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to certain width and length limitations. [6] For merchant trade. [7] Prices for straight length material only, from a producer to a consumer. Functional discount of 25c. per 100 lb. to fabricators. [8] Also shafting. For quantities of 20,000 to 39,999 lb. [9] Carload lot to manufacturing trade. [10] These prices do not apply if the customary means of transportation (rail and water) are not used. [11] Ship plates only. [12] Boxed. [13] Portland and Seattle price, San Francisco price is 2.50c. [14] This bright wire base price to be used in figuring annealed and bright finish wires, commercial spring wire and galvanized wire.

GOVERNMENT CEILINGS—Price Schedule No. 6 issued April 16, 1941, governs steel mill prices; Price Schedule No. 49 governs warehouse prices, which are on another page of this issue.

EXCEPTIONS TO PRICE SCHEDULE No. 6—On hot rolled carbon bars, Phoenix Iron Co. may quote 2.35c. at established basing points; Calumet Steel division of Borg Warner may quote 2.35c., Chicago, on bars from its 8-in. mill; Joslyn Mfg. Co. may quote 2.35c., Chicago base. On rail steel bars Sweets Steel Co. may quote 2.33c., f.o.b. mill. On hot rolled sheets, Andrews Steel Co. may quote for shipment to Detroit area on Middletown base. On galvanized sheets, Andrews Steel may quote 3.75c., at established basing points. On hot rolled strip, Joslyn Mfg. Co. may quote 2.30c., Chicago base. On plates, Granite City Steel Co. may quote 2.35c., f.o.b. mill, and Central Iron & Steel Co. may quote 2.20c., f.o.b. basing points. On shapes, Phoenix Iron Co. may quote 2.30c. established basing points and 2.50c. Phoenixville for export.

On rail steel merchant bars, Eckels-Nye Corp. may charge 2.40c. On tubing, South Chester Tube Co. may price Gulf or Pacific Coast all-rail shipments and shipments west of Harrisburg on basis of f.o.b. Chester. On lend-lease sales to eastern seaboard, Sheffield Steel Co. and Colorado Fuel & Iron Corp. may sell f.o.b. mill. SEMIFINISHED STEEL—Follansbee Steel Corp. may sell forging billets at $49.50 f.o.b. Toronto; Continental Steel Corp. may sell Acme Steel Co. at $34 for rerolling billets plus extras and freight; Ford Motor Co. may sell rerolling billets at $34 f.o.b. Dearborn; Andrews Steel Co. may sell forging billets at $50 at established basing points and slabs at $41; Empire Sheet and Tin Plate may sell slabs at $41 at established basing points and sheet bars at $39 f.o.b. mill; on lend-lease sales Northwestern Steel & Wire Co. may charge $41 per gross ton f.o.b. mill for rerolling billets; on lend-lease sales Wheeling Steel Corp. may charge $36 per ton for small billets, f.o.b. Portsmouth and $37 per ton for sheet bars f.o.b. Portsmouth; Laclede Steel Co. on semifinished sales for lend-lease shipped to eastern seaboard may use Chicago basing point prices f.o.b. Alton and Madison, Ill. ALLOY STEEL BARS—Texas Steel Co. may use Chicago base f.o.b. Fort Worth.